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THE IRON TRADE REVIEW

VOL. XXXIII. CLEVELAND, O. DECEMBER 20, 1900 CHICAGO, ILL. NUMBER 51

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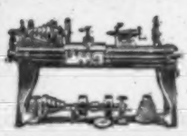

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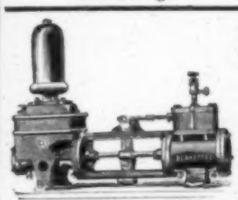

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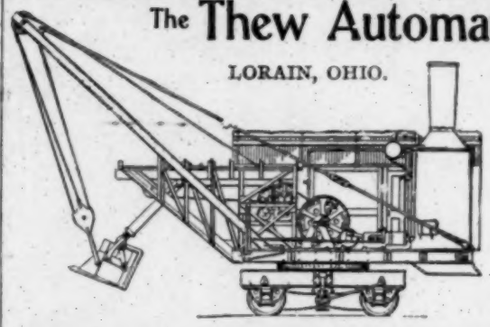

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THE IRON TRADE REVIEW

VOLUME XXXIII. CLEVELAND, O. DECEMBER 20, 1900. CHICAGO, ILL. NUMBER 51

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Seldom has a year closed with the iron trade in such satisfactory condition from the standpoint of both buyer and seller, as is the case at present. Production of pig iron is increasing, after five months of steady curtailment following June. At the same time stocks, which on Nov. 1 for the first time in the year showed a decline, are now being reduced sharply, as indicated by a falling off of 80,000 tons between Nov. 1 and Dec 1. Prices that in the summer months had fallen below the cost line to many producers have made a moderate advance, and are now on a level insuring a fair profit, though the mills have fared better in this respect than the blast furnaces thus far. The latter as a rule have sold for the first quarter of 1901, and in some cases for the first half; but here as in finished material there has been much more than the usual conservatism in commitals on future business, and sellers are in position to realize on a large part of their output in 1901 whatever return general conditions in the new year may bring. Coke contracts have been made for the first half of 1901 in a good many instances and the price to furnacemen has not been above $1.75 for Connellsville coke, while producers in other districts have tied up at $1.50 to $1.60. The question of Lake Superior ore prices is entirely open as yet, and reports of an appointed meeting of the Bessemer Ore Association are incorrect. No light has come as yet on the situation as it relates to merchant furnaces producing Bessemer iron. Steel works, with perhaps one exception, are not likely to want outside metal for some months. An offer to sell a block of 50,000 tons at $13 Pittsburg has been withdrawn, it is now reported, but portions of this amount have sold at $13.25 and $13.50 Pittsburg. Producers of standard brands of foundry iron are firmer in their views, with an advance of 25 cents on local irons in the Chicago district. The consumption of finished material is apparently on a widening scale. Mills are well supplied with work and the slackening of operations at the turn of the year will be only such as holiday observances and necessary repairs require. The interruption will scarcely be felt in the consumption of pig iron and half-finished steel. The plate mills are conspicuous in their accumulation of orders, all being filled for weeks ahead and the largest producer for nearly six months. The abolition of commissions by the plate pool, following the practice of the beam pool, will have a tendency to restrict sales in territory remote from the mill, except in cases of direct representation through agencies. A meeting of structural steel manufacturers at New York last week made no change in prices which are likely to remain unaltered until spring. Demand is well sustained for the winter season and prospects for the new year are very encouraging. Some additions to rail orders, but no large contracts, have been made in the week, and the total is now put between 1,100,000 and 1,200,000 tons. While new orders for finished material have not been plentiful the past week and will not be until the inventory period has been passed, there is active specifying on contracts, indicating that consumers of iron and steel are well employed. This is strongly emphasized in ships yards, bridge works, car and locomotive works, as in general erecting and engineering establishments.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, Dec. 19.

Little of special interest has transpired in the iron and steel industry in this district during the past week, and the even tenor of the business thus far this month will doubtless continue unbroken until after the first of the year. Already there is much speculation on what the new year will bring forth in the iron trade. Much conservatism is being shown by buyers, as many believe that a slight falling off in prices would not be amiss, while the manufacturers are by no means anxious to book new business, as they are pretty generally of the opinion that prices will at least remain stationary, if they do not advance. Conditions here are all very favorable to a maintenance of present prices, and should any considerable amount of new business present itself, there is little doubt that present prices will be advanced. In finished lines this it especially true. In plates, for example, the mills of the country are loaded up for months in advance, and one large producer has enough orders booked to keep his mills in operation until May or June. Under these conditions there is little prospect of a decline. In steel bars no weakness has yet been shown. Owing to the large tonnage placed during the summer there must of course be proportionately less business in the winter months. However, the summer contracts filled up the mills to such an extent that they are from a month to six weeks behind on their deliveries. Structural material is expected to remain on the present basis, despite the fact that nearly all mills have more orders on their books at present than they had during the summer months. In the past few days bids were received for the construction of the Fort Wayne bridge across the Allegheny river, which will require from 10,000 to 12,000 tons of material, and there is little doubt that the steel required will be rolled in the Pittsburg district, when contracts are awarded. Should present demand continue throughout the winter months, it is probable that the starting up of additional work in the spring will result in an advance. The demand for pipes and tubes has kept up exceedingly well for this season of the year, and though a remarkable record was made during December of last year, there is every indication that the largest producer will break the record with this month's tonnage. While no advance in prices is anticipated in these lines, nothing but a movement similar to that which resulted in the big break last spring can bring about a reduction in quotations. In merchant steel, wire, wire and cut nails, no immediate advance is anticipated but there is nothing that can be seen at present that suggests a reduction from the present prices. In raw material the situation is more mixed. While little has been done thus far this month in Bessemer pig iron, and prices have been low and somewhat variable, continued demand for rolled material must eventually result in a better demand for pig iron. However, with the large amount of iron reported to be piled at furnaces of the large producers, it would seem that some time will be required for such a demand as to compel the lighting of idle merchant furnaces in the Valleys. In foundry and mill irons, a steady market is anticipated after the first of the year. Representatives of the various interests included in

the beam agreement met in New York City last Saturday to discuss the present situation, and to revise allotments somewhat. Present prices were reaffirmed, and all the mills reported a fair amount of business on hand. Thus far the railroads have failed to announce a reduction in freight rates from Pittsburg to the seaboard owing to a contention that has arisen among themselves. However it is still the prevailing opinion that the reduction will become effective by the first of the new year.

PIG IRON.—The offer made by one of the consolidations to dispose of 50,000 tons of Bessemer iron at furnaces in the Valleys at $13 delivered, Pittsburg, has been withdrawn, it is reported, as the owner has decided to convert the greater portion of the iron into steel. Small lots of this iron have been sold, aggregating in all nearly 10,000 tons, at prices ranging from $13 25 to $13.50, Pittsburg, although some brought as high as $13.90 delivered. An additional 10,000 ton lot has been offered. In other instances $13.50 at the furnace is being asked. Needless to say none is going at this price. In mill iron sales aggregating approximately 3 000 tons have been made at prices ranging from $13.25 to $13 50, delivered Pittsburg. Sales of foundry iron are almost wholly restricted to small lots at prices ranging from $14 to $14.50. Southern iron is quoted more than $1 per ton above Northern foundry, and except where it is utilized in mixtures it is in little demand. We revise our quotations as follows:

Bessemer, Pittsburg	$13.25 to $13.90
No. 1 Foundry	14 50 to 15 00
No. 2 Foundry	14 00 to 14 50
No. 3 Foundry	13.50 to 14 00
Gray Forge, Pittsburg	13.25 to 13.50

STEEL.—No large business in billets or sheet bars is being placed. Small lots continue to be sold at agreed prices. Prices are unchanged as follows: 4x4 billets, delivered, Pittsburg, Wheeling or Valley at $19 75. On less than 4-inch billets down to 1¼ inch $1 extra is charged. Open-hearth billets are $1 per ton above Bessemer billets at all delivered points. Sheet and tin bars are $1 above Bessemer billets.

FERRO-MANGANESE.—We quote 80 per cent domestic at $62.50 per ton, delivered at buyer's mill, in carload lots.

RAILS AND TRACK MATERIAL.—Outside of an order for several thousand tons of steel rails awarded to the largest producer, no large business has been placed during the week. A scarcity of light rails continues and mills that roll them are weeks behind on deliveries. Our quotations, unchanged, are as follows: Rails, standard sections, 50 pounds and over, in lots of 200 tons and over, $26; car lots and less than 200 tons, $28; less than car lots, $30; 8 to 12 pounds, $29 to $30; 16 to 20 pounds, $28 to $29; 25 to 40 pounds, $27. Track material: Spikes, 1.70c to 1.75c; track bolts, square heads, 2.25c; hexagon heads, 2.35c; fish plates, 1 40c to 1.50c.

SPELTER.—Spelter is weaker and prime Western grades are held at 4.10c to 4.15c, Pittsburg.

MUCK BARS.—In this report last week it was stated that a sale of muck iron had been made at $23 50 per ton delivered, Pittsburg. This was an error. It should have been $25.50 delivered, Pittsburg. We have been advised of a sale of muck bar, 300 tons, at $25 at the mill, Pittsburg There is little demand.

SKELP.—The export demand for skelp has fallen off considerably during the past few weeks, and the domestic demand is light for the time being, with the quieting of new business in pipes, tubes and casings. Prices, however, are unchanged. We quote sheared iron skelp at 1.50c to 1.55c, and grooved at 1.45c to 1.50c. Steel skelp is held at 1.30c to 1.35c.

BARS.—Specifications on contracts placed last summer are plentiful and mills are unable to make deliveries. A fair amount of new business is also being placed for this season of the year. While one Western Pennsylvania mill is holding bars at prohibitive prices owing to its mills being unable to take care of more business, local mills are asking from 1.25c to 1.30c for small lots, while large lots can probably be placed at 1.20c. Common iron bars are quoted 1.30c to 1.35c, Pittsburg, and 1.25c to 1.30c in the valleys; refined iron bars, 1.75c to 2c delivered, Pittsburg.

PLATES.—Mills in this district continue to operate in full on orders placed during the past few months. None of them is able to make deliveries within two or three weeks from the time of specifying and one mill is unable to accept any new business, being booked for six months. Prices are firm and unchanged as follows: Tank plate, ¼ inch thick, up to 100 inches in width, 1.40c at mill, Pittsburg; flange and boiler steel, 1.50c; marine, ordinary fire-box, A. B. M. A. specifications, 1.60c; still bottom steel, 1.70c; locomotive fire-box, not less than 1.90c, and it ranges in price to 3c. Plates more than 100 inches wide, 5 cents extra 100 pounds. Plates 3 16 of an inch in thickness, $1 extra; gauges Nos. 8 and 9 $2 extra. These quotations are based on carload lots, with 5 cents extra a hundred pounds for less than carload lots. Terms, net cash in 30 days.

SHEETS.—The demand for sheets continues and we have been advised that the mills the largest producer has in operation are being operated in full. Independent mills report a strong demand with orders booked several months ahead. We revise our quotations as follows: Black sheets, No. 28 gauge, one pass through cold rolls, 2.95c to 3c; No. 27, 2.85c to 2 90c; No. 26, 2.70c; No. 24, 2.60c; No. 22, 2.50c; No. 20, 2.40c; No. 18, blue annealed, 2 15c to 2.20c; No. 14, 1.90c to 2c; Nos. 11 and 12, 1.75c to 1.85c; No. 10, 1.65c to 1.70c; plates, gauges 8 and 9, 1.55c to 1.60c. Sales of galvanized sheets have been made at 70 and 10 and we have been advised of one sale at 70 and 5, with no freight allowance.

STRUCTURAL MATERIAL.—A meeting of the representatives of the various interests forming the beam agreement was held in New York last Saturday for the purpose of discussing the present situation. Prices were reaffirmed, although some slight changes were made in the allotment feature of the pool. Bids were opened during the week for the erection of the Fort Wayne bridge across the Allegheny river by the Pennsylvania Company. While the contract has not yet been awarded it is almost a certainty that the structural steel will be furnished by one of the mills in this district. From 10 000 to 12,000 tons of material will be required. The American Bridge Co. has been awarded the contract for the erection of three buildings for a naval station by the Japanese government requiring about 1,000 tons of steel, and cables from London say that the American Bridge Co. has taken the contract for building 30 bridges in Africa for the Uganda railroad, the total being about 7.000 tons. The Youngstown, O., plant of this consolidation also received contracts for several bridges calling for about 1,000 tons of structural material. Prices have been reaffirmed as follows: Beams and channels 3 to 15 inches, 1.50c; 18 to 24 inches, 1.60c; tees, 1.55c; zees, 1.50c; angles, from 3 to 6 inches, 1.40c; universal mill plates, 1.35c.

PIPES AND TUBES.—Demand for pipes, tubes and casings continues good despite the fact that the dull season is on. Prices are unchanged. Discounts to consumers in car lots, Pittsburg, are as follows:

MERCHANT PIPE.

	Black. per cent.	Galv'd. per cent
⅛ to ¼ inch and 11 to 12 inch	61	48
⅜ to 10 inch	68½	56

BOILER TUBES.

	22 Feet and under. Per cent.		Over 22 Feet. Per cent.	
	Iron.	Steel.	Iron.	Steel.
1 to 1¼ and 2¼ inches	49½	55	44½	50
1½ to 2¼ inches	45	51	39½	46
2½ to 13 inches	57	62	52½	58

CASING.

	S. and S., per cent.
2 to 3 inches	58
3½ to 4 inches	63
4½ to 12½ inches	65

O. D. PIPE.

	Per cent.
14 to 22 inches	42
24 inches, o. d. and larger	37

THREADS AND COUPLINGS.

	Per cent.
14 to 16 inches, o. d.	35

MERCHANT STEEL.—Foreign demand for tool steel is reported good by the Crucible Steel Co. of America, and the domestic demand is keeping up very well. Demand for hoops and bands is good and prices are unchanged. We revise quotations as follows: Tire steel in carload lots and over, 1.30c; less than carload lots, 1.35c to 1.40c. Toe calk is held at 1.40c to 1.45c in large lots, and in small lots as high as 1.50c is asked. Tool steel is held at 7c and upwards according to quality. Hoops and bands, 2c to 2.10c; shafting, carload lots, 57 per cent off; less than carload lots, 52 per cent off.

WIRE AND WIRE NAILS.—There is little doing in any of these lines and prices remain unchanged as follows: Single carloads of wire nails to jobbers, $2.20, Pittsburg; to retailers,

$2.30. Plain wire, carload lots, is quoted at $2.15 to jobbers and $2.25 to retailers; painted barb wire, $2.50 in carload lots to jobbers and $2.60 to retailers; galvanized barb wire, $2.80 in carload lots to jobbers and $2 90 to retailers. Cut nails are held at $1.95, Pittsburg, in carload lots with 2 per cent off in 10 days.

OLD MATERIAL.—There is little old material changing hands at present. Buyers are holding off for better prices, while dealers are of the opinion that they can secure better prices by holding their material until after the first of the year. Transactions are largely limited to carload lots. We revise quotations as follows: New Bessemer melting stock, $14 to $14.50, gross; old iron rails, $21 to $22, gross; busheling scrap, $12.50 to $13; cast borings, $7 to $7.50, net; wrought turnings, $8, net; cast scrap, $13, gross; steel rails, $14.50; mill lengths, $15.50; car wheels, $18, gross; No. 1 wrought scrap, $17, net.

COKE.—A number of coke contracts were closed in the past week for the first half of next year, but not at the prices expected by the coke trade a month ago. Several contracts for Connellsville furnace coke have been made at $1.75 at the ovens, while outside producers are closing at prices ranging from $1.50 to $1.60. We are also advised of a contract for Connellsville foundry coke at $2.20 at the ovens, the purchaser securing all benefits from any reductions in price during the six months that the contract is in force. During the week ending Dec. 8, there were 14 824 ovens active in the Connellsville region and the total production was estimated at 156,424 tons, which was a slight increase over the production of the previous week.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1522 MONADNOCK BLOCK, Dec. 18.

With the approach of the holidays usually comes a lull in business, and this year is no exception. The demand for nearly all kinds of iron and steel has not been large in the week just closed and sales have not been heavy. Mills and furnaces are well sold ahead and are in good shape to stand a dull season, and it is not expected that the period of dullness will be protracted. Sellers usually are looking for a very considerable business to be placed right after the first of the year, or as soon as the inventory period is over.

PIG IRON.—There were a number of fair sized orders, including several of 500 to 1,000 tons. Buyers do not usually make large purchases at this season, and the tonnage closed has been fully up to the average for this time of year. The market is very firm, and local furnaces have advanced their quotations about 25 cents a ton in the week. They have had no difficulty in getting the advance on all business that has been placed since The local furnaces are well sold ahead, and several of the Southern producers selling in this market have very little of some grades of iron for sale. One of the Bridgeport furnaces of the Illinois Steel Co. has started up. Otherwise there is no change in the furnace situation. The South Chicago Furnace Co.'s Calumet furnace will probably start the first of the year. Quotations are revised as follows:

Lake Sup. Charcoal	$18 50 @ $19 50	Southern Coke No. 4	$13 60 @ 14 10
Local Coke Fdy. No. 1	15 75 @ 16 00	Southern No 1 Soft	15 10 @ 15 60
Local Coke Fdy. No 2	14 75 @ 15 00	Southern No 2 Soft	14 60 @ 15 10
Local Coke Fdy. No 3	14 25 @ 14 50	Southern Silveries	16 25 @ 16 75
Local Scotch Fdy. No.1	15 75 @ 16 00	Jackson Co. Silveries	18 50 @ 20 00
Local Scotch Fdy. No.2	14 75 @ 15 00	Ohio Strong Softeners	16 80 @ 17 30
Local Scotch Fdy No.3	14 25 @ 14 50	Alabama Car Wheel	21 75 @ 21 75
Southern Coke No. 1	15 10 @ 15 60	Malleable Bessemer	15 00 @ 15 50
Southern Coke No. 2	14 60 @ 15 10	Coke Bessemer	15 00 @ 15 50
Southern Coke No. 3	14 10 @ 14 60		

BARS.—The demand has not been large and no very important sales were closed in the week, although a few lots of from 250 to 500 tons were placed. The mills are all well sold ahead, and are very firm in their views, holding the market stiff at 1.40c to 1.45c for steel and about the same for iron, half extras, Chicago delivery.

STRUCTURAL MATERIAL.—The market has been quiet, with no very important sales closed. A few orders ranging from 1,000 tons down were placed by local users for stock. None of the large building projects on the tapis have been closed. Quotations are unchanged as follows: Beams, 15 inches and under, 1.65c; 18 inches and over, 1.75c; angles under three inches, 1.40c to 1.45c; over six inches, 1.65c; three inches to six inches, 1.55c; plates, 1.55c; tees, 1.70c; zees, 1.65c; small lots from store are quoted ¼c to ½c higher.

RAILS AND TRACK SUPPLIES.—Business in standard sections has been limited to small lots. Good orders for light sections are taken every day, and there is also a good demand for fastenings. Quotations are as follows: Rails, standard sections, $26; light sections, $26 to $28; splice bars, 1.40c to 1.50c; spikes, 1.70c to 1.75c; track bolts, hexagon nuts, 2.55c to 2.60c; square nuts, 2.40c to 2.50c.

PLATES.—Sales have been in comparatively small lots, and not very many of these, for mill shipment. Store business has been fair, but did not include any very large business. Prices are made as follows, mill shipment, Chicago delivery: Tank steel, 1.55c; flange steel, 1.65c; marine steel, 1.75c; firebox steel, ordinary, 1.75c; fire-box, special, 2.25c and upwards.

BILLETS AND RODS.—A few small sales of billets were made at the agreed price of $20.75. No sales of rods are reported.

SHEETS.—There continues to be a good demand and sales last week were rather above the average for the season of the year, both for black and galvanized sheets. Quotations are firm and unchanged at 3.18c for No. 27 black, Chicago, and 70 and 10 per cent off for galvanized, f. o. b. mill.

MERCHANT STEEL—The market has been quiet, with no important contracts closed in the week. Quotations are as follows, mill shipments, Chicago delivery: Smooth-finished tire steel, 1.75c to 1.85c; open-hearth spring steel, 2.15c to 2.35c; toe calk, 2.40c to 2.55c; sleigh shoe, 1.70c to 1.80c; cutter shoe, 2.40c to 2.55c; ordinary tool steel, 6c to 7c; specials, 13c and upwards.

MERCHANT PIPE.—The demand is unchanged. No especially large contracts have been closed lately, or are in sight for the immediate future. Random lengths are quoted as follows:

MERCHANT PIPE.

	Carload lots.		Less than carload lots.	
	Black Per cent.	Galv. Per cent.	Black Per cent.	Galv. Per cent.
⅛ to ⅜ and 11 to 12 in.	59.2	46.2	54.9	40.9
½ to 10 inches	66.7	53.3	61.9	49.9

WIRE AND WIRE NAILS.—There continues to be a good demand, and sales in the week were exceptionally large, considering the season. Dealers and consumers alike are large buyers. Makers quote single carloads of wire nails at $2.48 f. o. b. Chicago, and $2 63 for less than carloads. On wire, current quotations are as follows: Plain annealed wire, $2.43; painted barb wire $2.78; galvanized barb wire, $3.08.

OLD MATERIAL.—The demand is light. The market is quite a little weaker, and prices have been marked down from $1 to $2 a ton on nearly every grade of scrap. It is not expected that sales will increase in size before the first of the year. The following fairly represent dealers' selling prices, per gross ton:

Old iron rails	$17 50@$18 00	Country malleable	$ 9 50@$10 00
Old steel rails, long	14 00@ 15 00	Iron axles	19 50@ 20 00
Old steel rails, mixed	10 00@ 10 50	Cast borings	4 50@ 5 00
Relaying rails	20 00@ 22 00	Wrought turnings	8 00@ 9 00
Old wheels	15 00@ 16 00	Iron axle turnings	9 00@ 10 00
Railroad forge	16 50@ 17 00	Steel axle turnings	8 00@ 8 50
Dealer's forge	13 50@ 14 00	Mixed country steel	8 50@ 9 00
No. 1 cut mill	10 00@ 11 00	Stove plates	8 50@ 9 00
Heavy cast	12 00@ 13 00	Heavy melting steel	10 00@ 11 00
Railway malleable	12 50@ 13 10	Old iron splice bars	17 50@ 18 00

CLEVELAND.

OFFICE OF *The Iron Trade Review*.
CAXTON BUILDING, Dec. 18.

Final cargoes went out from Escanaba and Marquette in the past week and the total of water shipments of ore from upper lake ports for the season is found to be 18,570 315 tons, or 669,119 tons in excess of the record for 1899. The shipments after Nov. 1 this year were 1,282,358 tons, as against 2,306,898 tons last year, when every nerve was strained to get down the last pound. The generally telegraphed statement that Jan. 25 has been fixed as the date for the Bessemer Ore Association is erroneous. No time has been decided upon, and no appointment is made even for the informal conference that precedes the general meeting. It is probable that when figures concerning the year's work at the various mines are made up and estimates received from mine superintendents as to the possibilities of production next year, the officers of the association will confer in the early part of January and later all old-range interests will come together.

PIG IRON.—Sales of foundry iron are still being made on a basis of $13.50 in the valley for No. 2 and $14 for No. 1, but there are sellers at $13 25 for No. 2, and a shade less. The situation is very quiet. Some few buyers are in the market to take care of immediate wants and an occasional inquiry for three months and six months deliveries comes up. Sellers are quite firm in view of the strong statistical position of the blast furnaces. There seems to be no outlook for Bessemer

ron for the immediate future, and idle merchant furnaces whose last run was on Bessemer are either disposed to continue the wait until there are more favorable developments, or to start up on foundry iron. The foundry trade seems the only present outlet for their product. One or two steel makers will need some iron in the first quarter of the year; but apparently there are other steel makers who are in position to supply them, in part at least. There is little movement in gray forge. We make all quotations for Cleveland delivery as follows :

Bessemer	$14 00@14 25	Valley Scotch No. 1	$14 75@15 00
No. 1 Strong Foundry	14 75@15 00	Valley Scotch No. 2	14 25@14 50
No. 2 Strong Foundry	14 00@14 50	Gray Forge, valley	13 00@13 25
No. 3 Foundry	13 50@14 00	Lake Superior Charcoal	18 00@18 50

FINISHED MATERIAL.—From all local offices good specifications on contracts are reported, but in the past week relatively little new business has been placed. The quietness of the closing weeks of the year is not without evidence, however, of the strong position of the mills. In the plate market matters are at a standstill with some producers, orders being refused because of congestion at the mills. One maker is filled up for six months. Under the plate pool arrangement there is little likelihood of distant mills going after business in this territory, the trade in their own normal territory being now more secure to them and netting much better prices at the mill. The decision of the members of the pool to pay no commissions on sales will probably make some changes in the handling of the local plate trade, but nothing definite has developed as yet. The burning of the Brown Hoisting Machinery Co.'s plant cuts off a leading factor in local steel consumption for the present, but rebuilding will require structural steel at once, and it is expected resumption will be nearly complete in 60 days. Quotations are continued as for last week: Tank plates, 1.40c Pittsburg; beams and channels, 1.50c Pittsburg; angles, 1.40c for three-inch and wider; No. 27 black sheets, one pass through cold rolls, 2.80c to 2.90c; steel bars, 1.25c to 1.30c Cleveland; bar iron, 1.30c valley mill; 1.50c out of stock, Cleveland.

OLD MATERIAL.—Buyers are taking less interest in the market than for some weeks. The transactions reported indicate slightly lower prices in some lines, but dealers are not willing to make any material concessions to effect sales. We quote Cleveland prices as follows, all gross tons: Old iron rails, $19 to $19.50; old steel rails, $11.50 for lengths under 6 feet and $13.50 over 6 feet; old car wheels, $15 50 to $16; No. 1 railroad wrought scrap, $16.50 to $17; busheling scrap, $14; No. 1 machinery cast scrap, $13.50; iron axles, $22.50; wrought turnings, $10; cast borings, $6; grate bars, $8.50; pipes and flues, $13; stove plate, $8.

CINCINNATI.

Dec. 18.

Matthew Addy & Co.'s weekly review of the iron market says: "The usual holiday quiet is beginning to be felt in the market. This is the normal thing at this time of the year, so there is nothing unexpected about it. Yet in spite of the fact that there is but little new buying, the demand for faster shipment on old orders is still pressing and imperative. And while the market is quiet it is so only compared with the great activity of a few weeks ago, for there is a steady buying at the full schedule prices. The December tonnage is already good, and it will of course be much increased before the month closes. We find that the general foundry trade is remarkably busy. From everywhere we have the same encouraging reports and the outlook is exceedingly good. For months general conditions have been improving until now things have so shaped themselves that a prosperous season ahead is assured. We believe that seldom has a new year opened with so many things in its favor. The greatest thing from the standpoint of a pig iron seller is that the consumers are all full of business with their iron yards practically empty. The buying movement in November did not begin to cover consumers' requirements. An immense amount of iron must still be purchased and the early months of the year are bound to see buying on an extensive scale."

From Rogers, Brown & Co.'s market comment we take the following: "The business of the week under review has been very satisfactory. The demand has kept up remarkably, considering the quite heavy general buying through the preceding eight weeks, and the near approach of stock-taking and book balancing, only a fortnight distant. Consumption keeps well up for the winter period. Production has increased slightly, but notwithstanding this increase, furnaces and warrant yard stocks were reduced during November at the rate of 1,000,000 tons per annum. This fact, foreshadowed in our letter of last week, will impart additional confidence in the general situation as to prices, and if the market needed it, would prove a strong tonic."

We quote for cash f. o. b. cars Cincinnati: Southern coke, No. 1 foundry, $14.75 to $15.25; No. 2, $13.75 to $14.25; No. 3, $13.25 to $13 50; No. 4, $13 to $13.25; gray forge, $12.75 to $13; No. 1 soft, $14.75 to $15.25; No. 2 soft, $13.75 to $14 25; Lake Superior coke, No. 1, $15.50 to $16; No. 2, $14.50 to $15; Hanging Rock charcoal, No. 1, $20 to $21; Jackson Co. silvery, No. 1, $17 to $17 50; standard Georgia car wheel, $18.75 to $19.75; Lake Superior charcoal, $19 to $20.50.

PHILADELPHIA.

Dec. 17.

The general condition is satisfactory and the outlook bright. The increase in pig iron production seems likely to continue, especially after the beginning of the new year. Makers have reduced their stocks in yard and are pretty well sold up for the first quarter. Prices are steady and insure a fair margin for profit. Export business is quiet at the moment, with declining prices on the other side.

PIG IRON.—Between Nov. 1 and Dec. 1 the increase in the production of pig iron was at the rate of nearly 60,000 tons a month, and stocks during the same period were decreased by over 80,000 tons. There is no fear of a slump, so far as expressions from producers indicate, and a still further increase in production is looked for. For the present there is a lull in buying, but the early part of the year will doubtless see a heavy tonnage placed. Blast furnaces have filled their books for some time to come. The recent increase in production includes some brands more or less uncertain and prices must be fixed accordingly. These brands will largely have the market to themselves for the next few weeks, standard brands being well sold up. Quotations are as follows: No. 1X foundry, $16.50 to $17; No. 2X foundry, $15.50 to $16.25; No. 2 plain, $14.75 to $15.25; gray forge, standard brands, $14.25 to $14.75.

FINISHED MATERIAL.—Contrary to the experience of former years, business in all lines continues full. The shipyards, bridge works, car shops and locomotive works are still the heaviest buyers. As in other lines, export business is dull. Plates are firm at the pool price. We quote: Best refined iron bars, 1.45c to 1.55c; steel bars, 1.40c to 1.50c; plates, ¼-inch and thicker, 1.55c to 1.65c; beams and channels, 1.65c to 1.75c; sheets, Nos. 10–12, 1.80c to 2c; No. 14, 2.05c to 2.15c; No. 16, 2.20c; No. 20, 2.60c to 2.70c; No. 24, 2.90c; No. 27, 3.10c; No. 28, 3.20c.

OLD MATERIAL.—Steel scrap is easier, and offers to sell have been made at 50c reduction. On the other hand some lines are stiffer. Quotations are as follows: Choice railroad scrap, $17.50 to $18; No. 1 yard scrap, ordinary, $14 to $15; No. 2 light scrap, $12 to $12.50; machinery cast, $14 to $14.50; heavy steel scrap, $15 to $16; old iron rails, $17.50 to $18; old steel rails, $16 to $16.50; wrought turnings, $10 to $11; cast borings, $8 to $8.25; old car wheels, $17.50 to $18.

THE preferred and common stocks of the International Steam Pump Co. were listed on the New York Stock Exchange last week. The company earned during its first fiscal year a net profit of $2,049,631. In addition to paying its year's dividend at 6 per cent on the $12,500,000 preferred stock the company earned a surplus equal to 8.66 per cent on the $15 000,000 common issue.

AT the annual meeting of the National Association of Manufacturers of Water, Steam and Gas Brass Goods, held in Columbus recently, officers for the ensuing year were elected as follows: President, Adolph Blesch; first vice-president, G. T. Coppins, second vice-president, H. M. Haelscher; treasurer, J. B. Kalvelage; secretary, W. T. Doyle. The next meeting of the association is to be held in New York, Feb. 14, 1901.

It is reported that the Wheatland plant of the Continental Iron Co. at Wheatland, Pa., will resume operations shortly.

PERSONAL.

W. A. Wetmore, for nearly 20 years connected with the iron and steel trade in the far West, with the Colorado Fuel & Iron Co. and its predecessor, has left Denver to locate in San Francisco as division sales agent of the company.

The new library building of the University of Wooster, at Wooster, O., the gift of H. C. Frick, of Pittsburg, was dedicated last week.

J. Edward Simmon, president of the Fourth National Bank of New York, gave a banquet to Charles M. Schwab of the Carnegie Co. at the University Club, New York, Wednesday evening, Dec. 12 It was attended by Andrew Carnegie, several officials of the Carnegie Steel Co., and New York's most prominent bankers. Mr. Schwab in an address of some length pointed out some of the wonderful developments in iron and steel manufacture in the past 20 years. He found great prospects for the near future, also.

George J. Humbert, manager of the American Tin Plate Co.'s Pittsburg district and general manager of the Humbert plant of six mills at South Connellsville, Pa., has resigned. He will devote his time to his extensive interests in Connellsville.

E. E. Cline, manager of the sheet mills of the American Sheet Steel Co. at Canal Dover, O., has been appointed superintendent of the district comprising the mills of the company in New Philadelphia, Canal Dover, Dennison, Dresden and Canton.

Ex-Speaker Thomas B. Reed visited the Homestead Steel Works of the Carnegie Steel Co., Monday of this week, to note the workings of the metal mixer which is the cause of litigation now in the courts between the Carnegie Steel Co. and the Cambria Steel Co., of Johnstown, Pa.

The president has sent to the Senate the nomination of John G. A. Leishman, now envoy extraordinary and minister plenipotentiary to Switzerland, to be minister to Turkey.

Obituary.

The death of Michael G. Mulhall, the statistician, is announced in a London cablegram of Dec. 13. In 1861 he founded the first English newspaper in South America, the Buenos Ayres *Standard*. He has become widely known for his efforts to popularize the knowledge of statistics of trade and population. He attended the Anglo-American Scientific Congress in Philadelphia in 1884. His principal works are: "The Progress of the World," 1880; "Dictionary of Statistics," 1886, and "Industries and Wealth of Nations," 1896. In an article contributed to the July number of the *North American Review*, under the title "A Forecast of the 12th American Census," he had predicted that the census would show the United States to have a population of 76 200,000. The count enumerated 76,295,000 people.

John A. Magee, well known in the machinery and hard ware business at Clarion, Pa., died Dec. 11 at the Mercy hospital, Pittsburg, aged 49. He had built up a large business in hardware and machinery at Clarion.

James Douglass, senior member of the Douglass-Wishler Fire Brick Co., of Vanport, Pa., died at his home at Rochester, Pa., last week. He was 61 years old.

Adolph E. Schoeninger, president of the Western Wheel Works, of Chicago, died Thursday, Dec. 13, at Los Angeles, Cal., of tuberculosis.

Thomas Taylor, president of the Utah Coal & Iron Co., dropped dead at Los Angeles on Dec. 10. He was 74 years old and had been connected with the industrial development of Utah for 50 years.

H. R. HYNDMAN has been appointed assistant sales agent of the Washington Coal & Coke Co., Pittsburg. The large trade of this company has necessitated the appointment of such a representative to travel among its customers.

AT the monthly meeting of the Engineers' Society of Western Pennsylvania at Pittsburg, Tuesday evening, Dec. 18, H. W. Fisher read a paper entitled, "Methods of Locating Faults in Underground Cables." The following were elected to membership: John W. Landis, Pittsburg office of the Goubert Mfg. Co.; William G. Shrom, with Westinghouse, Church, Kerr & Co.; A. L. Conner, mechanical engineer, with the American Tin Plate Co.

THE PITTSBURG DISTRICT.

H. K. Porter & Co., of Pittsburg, shipped last week one of the largest compressed air locomotives yet made to Iona Island, on the Hudson, for the United States government. The engine is standard gauge and weighs 22 tons.

Work has begun at Etna, Pa., on a machine shop for Spang, Chalfant & Co.

Zug & Co., of Pittsburg, have awarded the contract for the erection of a two-mill sheet plant to MacIntosh, Hemphill & Co., of Pittsburg. With this addition Zug & Co. will have six sheet mills with a capacity of about 50 tons per day. Twenty-two puddling furnaces will be torn down to make room for the new mills. During the past few months the company has received an unusually large number of orders, being filled up until next March.

The Sanitary Screen Ventilator Co., of Pittsburg, has been incorporated with a capital of $10,000. The directors are J. W. Painter, J. C. Smith, C. W. Wood, J. P. Hill and Sidney Vandusen.

Jones & Laughlins, Ltd., have notified all their employes that all individual wage contracts would be renewed and that no reduction in pay will be made. The new contracts with the men will run for 18 months. None of the skilled employes at the plants of this company receive less wages than prescribed in the scale of the Amalgamated Association, and in a number of instances higher wages are paid.

Bids have been received in the past week by the Pennsylvania company for the Fort Wayne bridge across the Allegheny River. Fully 10,000 tons of steel will be required.

A lively contest is on at Mt. Union, Pa., over the possession of the plant of the Haws Fire Brick Co., which was built about a year ago. It is alleged that the Harbison-Walker Fire Brick Co. some time ago secured options on a majority of the stock in the company and that when it attempted to secure possession some of the stockholders refused to transfer their stock. Representatives of the Harbison-Walker Co. then gained entrance to the plant and built a high fence around it and have been in possession for more than a week. The Haws faction then applied for a temporary injunction, which was granted, returnable Jan. 3.

Immediately after the first of the year, James McKay & Co., chain manufacturers of Pittsburg, will break ground at McKees Rocks, Pa., for the erection of a large chain plant. The plant is at present located at 29th and Liberty Sts. but quarters are far too small. The new site is eight acres in extent and has direct connections by means of the Pittsburg, Chartiers & Youghiogheny railroad, with the Pittsburg & Lake Erie and B. & O. railroad lines. The plant will consist of a main building, 175x85 feet, two stories high, which will have two wings respectively 65x250 feet and 40x275 feet and one story high. The building will be of steel and brick. It will be entirely equipped with new machinery, excepting a testing machine and a blower. The plant will contain 60 fires to manufacture chains of sizes from 3-16 to ¾ an inch; 20 fires to make machine-welded chains from 9-16 to 1¼ inches, and 20 fires for hand-welded chain up to the largest sizes made, giving a total of 100 fires and giving employment to 250 men. Electricity will be used for operating all the machinery.

Bids for 37,000 feet of 48 and 36-inch water mains for the city of Pittsburg have been advertised for. Fully 10,000 tons of iron pipe will be required.

The Westinghouse Electric & Mfg. Co. is installing the electrical plant for the new locomotive works of the Pittsburg, Bessemer & Lake Erie railroad at DuBois, Pa.

The Carnegie Steel Co. this week commenced the loading of 100 barges with 50,000 tons of steel rails that are to be shipped south to Ohio and Mississippi river points as soon as a deep water stage exists. This is the largest shipment of rails ever made by river at one time.

New Rod Mill Record.—At the No. 2 rod mill of the Illinois Steel Co. at Joliet, Ill., in the night turn of Dec. 10, the record was exceeded in an output of 537,700 pounds, or 240 gross tons, of No. 5 rods. The mill also outdid itself in the month preceding, the average output being 196 gross tons of No. 5 rods to the turn. The greatest reported record previous to the above was made at the Rankin plant of the American Steel & Wire Co., the day turn on Nov. 8 producing 515,030 pounds of No. 5 wire rods.

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AND
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DECEMBER 20, 1900.

STEEL EXPORTS AND THE TARIFF.

Now and then it occurs to some writer on industrial economics that the vicious protective duties on iron and steel are not sufficiently held before the minds of an oppressed people. A Chicago paper found occasion in the recently cabled sales of Pittsburg plates at Glasgow, to inveigh against the sale abroad of American steel at prices netting the mill less than it receives for its products sold for home consumption. The writer says that "if the plates which have been sent to the Clyde had been made abroad and imported by an American shipbuilder they would have had to pay a duty of not less than $8.50 a ton. That is the 'protection' which the Carnegie company enjoys now in American markets in addition to the protection afforded by ocean freights." But this view of the matter evidently is not the worst that is in the writer's mind, for he passes at once to what he considers a really "serious question," and that is, "whether that company and other manufacturers in the same business are using these high tariff duties to make American shipbuilders and railroad companies pay more for plates and rails than foreigners are required to pay." Or to be specific, the direct question is asked, "Are these manufacturers by reason of excessive protection to have two price scales, one for foreign and the other for domestic consumers, the latter being the higher of the two?" And then comes the conclusion, "If so, no time should be lost in revising duties of which so bad a use is made."

Referring to the first question raised—as to the duty which the American shipbuilder would have to pay on foreign plates imported into this country. What possible excuse could a sane American shipbuilder have for importing foreign plates when he can buy the best steel in the world at a less price than he would be charged for the foreign product at foreign port or at the foreign manufacturer's mill? Ship plates at Glasgow sold last week at $34. The same quality of steel delivered at a shipyard on the Delaware would cost the shipbuilder $31 a ton. Why cannot the free trade writers who consult maxims and theories but ignore markets, open their minds to the facts about iron and steel prices in the United States as compared with those abroad? We had recently some scores of columns of editorials cannonading the steel rail manufacturers of the country for asking $26 a ton for rails, when English rail manufacturers were quoting $30 and $31 at mill, and only a few weeks previous had been selling at $35 and $36.

To the charge of selling to the foreign buyer at a mill price sometimes lower than the buyer in the United States pays, American steel manufacturers must plead guilty. But the free trade censor is again astray in putting the responsibility upon "duties of which so bad a use is made." If the domestic price at American mill is less than the price of the foreign product at the foreign mill how is the tariff a factor in the domestic price? The complaint against export sales at a lower net price at works than the current home market price is not a new one; nor did the practice start with American manufacturers. They learned it from their British competitors. To run a plant at full capacity to get lowest unit cost, and market what the ordinary market will not take, in the territory of a competitor at a price that will sell it, is a device that has an ancient history all apart from tariffs, either protective or revenue. It is defended on the ground that surplus demoralizes a market and in time closes down works and depresses wages, and its disposal in distant territory is preferable to its disturbing presence in the home market. To put home prices on the same level, would simply mean putting home wages on a basis to compete with the lowest prices abroad. And if American manufacturers were required to be content with the same profit on all their product that is secured on the fraction of it that goes abroad, their career as factors in world commerce would be brief indeed. The command of resources making it possible to spend millions in a single year on improvements displacing and destroying plant that a few years previous represented other millions, is one of the essentials to a position of leadership in iron and steel manufacture. That such resources could be gathered from the scale of profits now realized in world-market competitions is only the dream of a theorist. And none know better than American steel works employes that if some of the prices on exports prevailed throughout the entire output, the corresponding wage scale would be on no such high level as that of today.

At the same time we look to see export business bring a more nearly normal profit as it broadens. Occasionally now, even with the handicap of widely fluctuating ocean freights, sales can be made for shipment abroad that approach the home standard of profit. For a time some months ago Southern pig iron producers found more profit in certain export sales than in business at the going prices at home. But the fact that foreign buyers will not tolerate such great and such rapid advances in price as have been known in this country, puts the burden of all fluctuations in freights and in raw

materials on the American manufacturer. Once having entered the lists he must make prices that will take the business.

It has remained for those who have opposed every measure leading up to the splendid development attained by the American iron industry to carp at every step taken in the direction of world supremacy—all the direct result of the very measures they have fought from the beginning. England may have her conspicuous corporations in iron and steel, with millions of capital, paying large dividends, and German industrials may make earnings little short of fabulous. But for the American manufacturer to build up an industry that is today foremost in bringing honor to the national name, is to earn the title of "subsidized steel baron" from detractors at home.

Pool in Cast Iron Soil Pipe.

The Central Foundry Co., the consolidation of a number of cast iron soil pipe manufacturers, formed last year, has made an agreement with the independent producers of soil pipe and the resulting pool will begin operations Jan. 1. The strength of the outside concerns has been growing steadily in the past year and the Central Foundry Co. at length decided that agreed prices were better than sharp competition without profit. The Central Foundry Co. is composed of the following concerns: Henry McShane Mfg. Co., Baltimore, Md.; J. Regester & Sons, Baltimore, Md.; Monitor Iron Works, Newark, N. J; Monitor Iron Works, Sing Sing, N. Y.; A. L. Swett Iron Works, Medina, N. Y.; Bignall Mfg Co., Medina, N. Y.; Beach & Co., Medina, N. Y.; Midvale Foundry Co., Allentown, Pa.; Phoenix Foundry & Mfg. Co., Lansdale, Pa.; Wilmington Pipe & Foundry Co, Wilmington, Del.; Shuster Foundry Co., South Pittsburg, Tenn.; Alabama Pipe Co., Bessemer, Ala.; E. L. Tyler & Co., Anniston, Ala.; Hoffman, Billings & Weller Co., Gadsden, Ala.; Rundle-Spence Mfg. Co., Milwaukee, Wis.; Bell Mfg. Co., Vincennes, Ind.; Humphreys Mfg. Co., Mansfield, O.; Ahrens & Ott Mfg. Co., Louisville, Ky.

The independent concerns, all of whom have gone into the pool, are the following: Abendroth Brothers, New York; Bessemer Soil Pipe Co., Bessemer, Ala.; Chattanooga Pipe & Foundry Co., Chattanooga, Tenn.; Hercules Iron & Supply Co., Anniston, Ala.; Independent Foundry Co., Portchester, N. Y.; McElwaine-Richards Co., Indianapolis, Ind.; National Foundry Co, Brooklyn, N. Y.; Ronalds-Johnson Co., New York and Haines port, Pa; L. Wolff Mfg. Co., Chicago, Ill.; N. O. Nelson Mfg. Co., St. Louis, Mo.; John Simmons Mfg. Co., New York, with foundry at Newark, N. J.

The members of the pool agree, under forfeit, to maintain prices and to abide by the regulations of the pool. The business is allotted and any manufacturer who makes more than his allotment must pay into the pool a percentage of his receipts, so large as to make such overrunning unprofitable. The country is divided into districts, and prices are made for each territory. New York and New England discounts are 70 per cent on 2 to 6-inch standard pipe, 75 per cent on extra heavy pipe and 75, 10 and 5 per cent on 2 to 6-inch fittings standard and extra heavy. There is a slightly better discount for Greater New York. No notification of the change was given to the jobbing trade, but for some weeks manufacturers have refused to take orders for delivery beyond Jan. 1.

A London cablegram of Dec. 13 says: "In the House of Commons today Lord Cranborne, parliamentary secretary for the war office, reverting to the subject of the contracts for the Uganda railroad bridges, for Africa, going to America, said the American Bridge Co. would build 30 bridges, using 7,000 tons of steel. The contracts totaled 13 500 tons. W. R. Cremer, Liberal, wanted to know if, after the American bids had been found to be the lowest, the English firms had been given an opportunity to revise their tenders. Lord Cranborne replied that it was not fair to the lowest bidder to invite other tenders to revise their bids.

LAKE SHIPMENTS OF IRON ORE, 18,570,315 TONS.

Complete returns from all upper lake docks give the unprecedented total of 18,570,315 tons as the water movement of Lake Superior iron ore in the season just ended. This is considerably less than the 20,000,000 tons prophesied early in the year, and yet somewhat more than the estimate given in these columns last summer when the blast furnace situation in the valleys was at its worst. It was then stated that the season's outcome bade fair to be under rather than over 18,000,000 tons. The table below gives the season record by ports, together with corresponding figures for the years 1899, 1898 and 1897. Gross tons are represented:

	1900.	1899.	1898.	1897.
Escanaba,	3,436,714	3,720,218	2,803,513	2,302,121
Marquette,	2,661 861	2,733,596	2,245,965	1,945,519
Ashland,	2,631,687	2,703,447	2,391,088	2,067,637
Two Harbors,	4,007 294	3,973,733	2,693,245	2,651,465
Gladstone,	418,854	381.457	335,956	341.014
Superior,	1,522,899	878,942	550,403	531,825
Duluth,	3,888 986	3,509,965	2,635,262	2,376,064
Total, by lake,	18,570,315	17,901,358	13,655,432	12,215,645
Total, all rail,	. . . .	350,446	369,241	253,993
Total shipments,		18,251,804	14,024,673	12,469,538

In 1896, one year earlier than is covered by the above table, the total water shipments were 9,644,036 gross tons. Thus in four years there has been almost a doubling of the ore traffic of the lakes. The year has had several conspicuous records of production. The Fayal mine leads with 1,252 952 tons. The Mountain Iron shipped 1 001,324, the Biwabik 924,868, and the Mahoning runs well toward a million tons. On the old ranges the Chapin, with 922,611 tons and the Norrie are the leaders. The Mesabi range made total shipments of about 7,765,000 tons, as against 6 626,384 in 1899, an increase of 1,139,000 tons. The Mesabi percentage is slightly under 42 per cent of the total.

A feature of the shipments this year is the unloading of a cargo of Canadian ore on a Lake Erie dock, the Helen mine in the Michipicoten district sending 2 456 tons to Ashtabula. It is likely that upwards of 300,000 tons of this ore will come down next year.

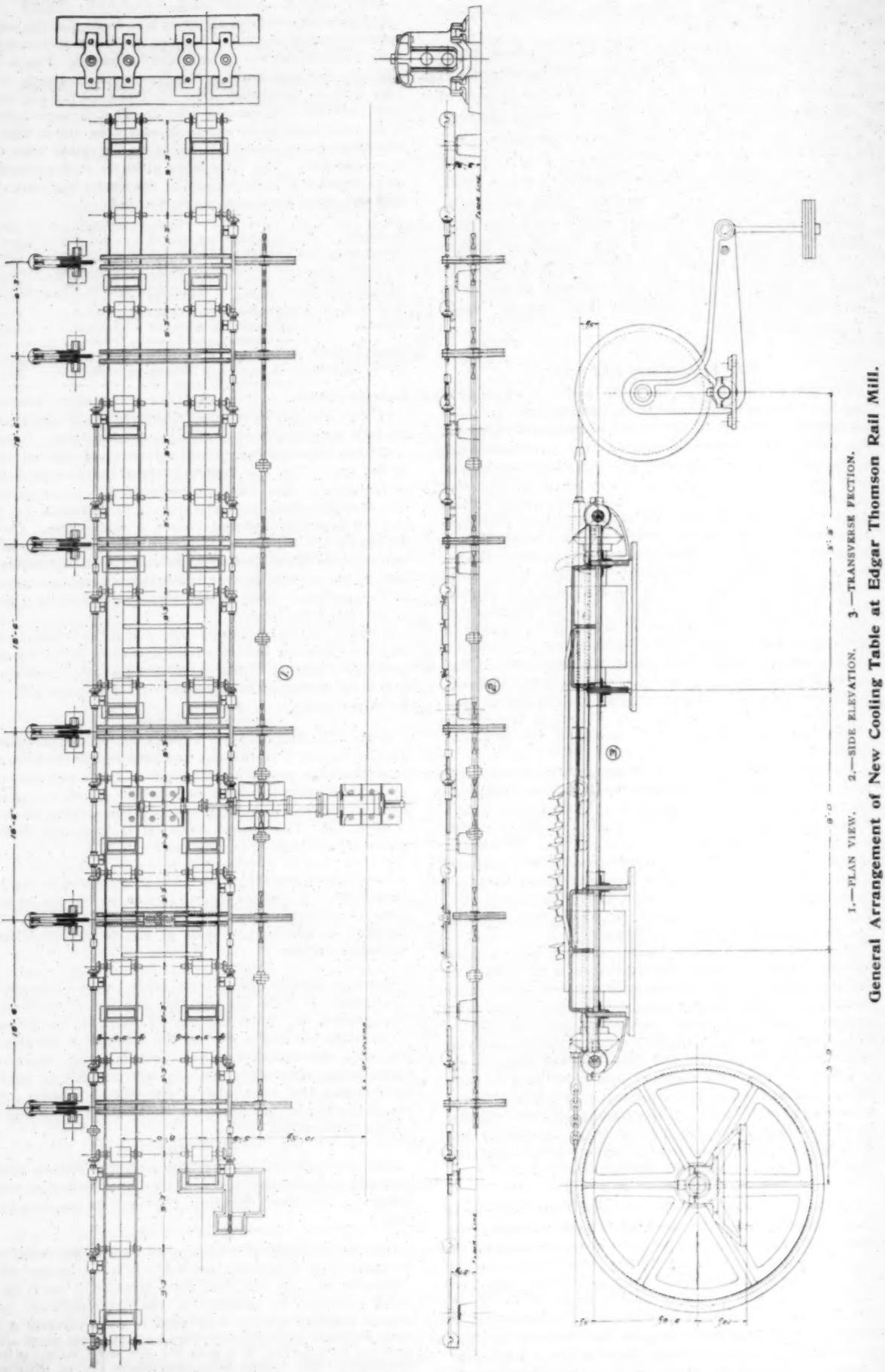
Concerning the newspaper dispatch stating that the plant of the Canton Roll & Machine Co. had been sold to the American Sheet Steel Co., we are advised by the Canton company that a sale of its stock has been made to J. B. Baird, of Chicago, and that the American Sheet Steel Co. has nothing whatever to do with it. The further statement is made that the business will be conducted as heretofore.

Milwaukee papers say that it has been decided by the J. I. Case Threshing Machine Co., of Racine, to remove its main plant to Milwaukee or to some point near that city. The company is now in the heart of Racine and cannot make needed extensions.

Many propositions have been made to the Youngstown Iron, Sheet & Tube Co. for the location of its plant at Youngstown, O., while the city of Niles, O., has offered a bonus of $50,000 and a site for the location of the plant in that city. No action has yet been taken on the various propositions, although a meeting will probably be held by the directors this week when a site will be selected. At a recent meeting of the directors it was decided to increase the capital to $2,000,000.

The Carnegie Co., including the coke, iron mining, steamship and other companies, will give a dinner to the company's officers at the Hotel Schenley, Pittsburg, on the evening of Jan. 9.

Ground was broken during the past week on the erection of the plant of the Allegheny Iron & Steel Co., to be erected at Tarentum, Pa., on the West Penn Division of the Pennsylvania Railroad. In addition to the sheet mills and open-hearth furnaces already mentioned in these columns it has been decided to erect a foundry and machine shop. The contract for a 1,500 h. p. engine for the sheet mills has been awarded to the Wickes Bros. Machinery Co., of Pittsburg. Offices of the company have been opened in the Lewis building, Pittsburg.



1.—PLAN VIEW. 2.—SIDE ELEVATION. 3.—TRANSVERSE FECTION.

General Arrangement of New Cooling Table at Edgar Thomson Rail Mill.

NEW RAIL ROLLING PROCESS AT BRADDOCK.

For several years past there has been considerable agitation among railroad and inspecting engineers, who claim that in wearing qualities the rails furnished them twelve or fifteen years ago were very much superior to the rails they are getting at the present time; and they have been insisting upon the manufacturers giving them a better wearing rail. In the attempt to accomplish this the makers have increased the contents of carbon and other hardening elements to as great an extent as they have thought could be done with safety. It is well known that more attention is being given to the chemical and metallurgical branches of rail making than ever before, and the analyses of rails made today are more uniform and better than they were a number of years ago. Notwithstanding the improvements in this direction, the rails are not giving as good results in the track as they did 15 years ago. Without doubt, to a great extent the trouble is due to the physical treatment of the rail steel and not to its chemical composition. Owing to the fact that the weight of rails has been increased and also that the modern rail sections have a large proportion of the metal concentrated in the head, as well as to the fact that the flanges are wide and thin, the heavy rails at present rolled in modern mills are finished while the head is extremely hot, whereas the older rails of smaller section, with a less proportion of metal in the head and rolled on slower mills, were finished at a much lower temperature. In order to improve the quality of the heavy rails manufacturers have recognized that the head should be finished at a lower heat, but in striving to accomplish this it is necessary that the initial heat of the bloom should not be reduced, this being none too high for the first forming passes of the mill, and also that the heat of the web and flanges should not be decreased to too great an extent.

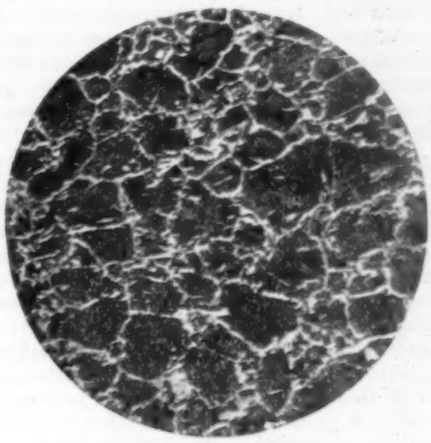


FIG. 4.—100-LB. RAIL. NEW METHOD.

FIG. 5.—100-LB. RAIL. OLD METHOD.

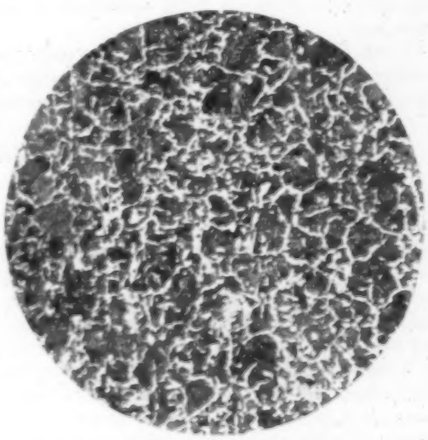


FIG. 6.—85-LB. RAIL. NEW METHOD.

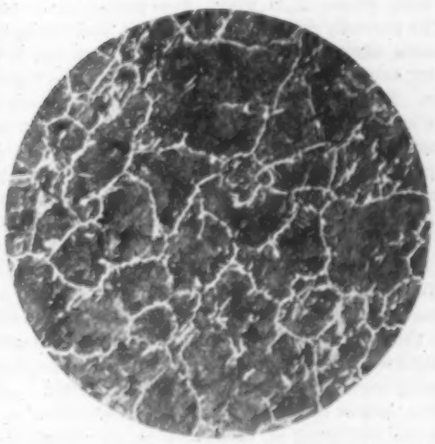


FIG. 7.—85-LB. RAIL. OLD METHOD.

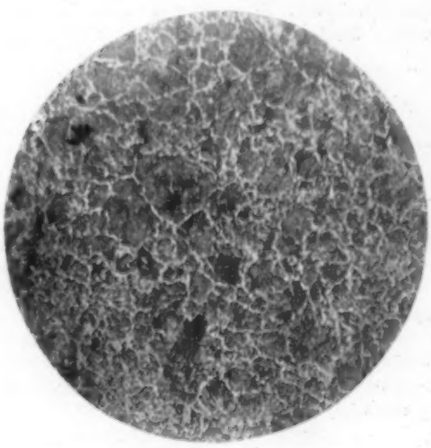


FIG. 8.—75-LB. RAIL. NEW METHOD.

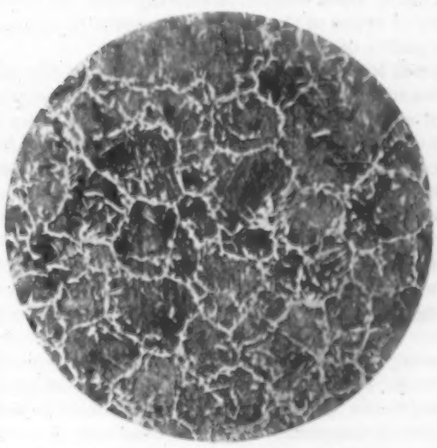


FIG. 9.—75-LB. RAIL. OLD METHOD.

Julian Kennedy, the well known Pittsburg engineer, and Thomas Morrison, general superintendent of the Edgar

Thomson Steel Works of the Carnegie Steel Co., invented some time ago a method of rolling steel rails at a much lower temperature than has hitherto been accomplished. In order to put this process in operation and give the railroads the benefits of improved quality rails as early as possible, the Edgar Thomson Steel Works were entirely closed down for about three weeks, and resumed operations on Wednesday morning, Dec. 5. In the interval the new machinery necessary for rearranging the rail mill to adapt it for making rails by this process, was installed at a great outlay of money. In order to put in this cooling arrangement it was necessary to tear out the old finishing rolls and the large engine which drives them, and place them 56 feet further down the mill, and 8 feet out of line of the intermediate rolls. It was also necessary to move the hot saws, saw run, curver, hot bed run and hot beds 56 feet further down the mill, which of course made it necessary to abandon the old foundations and put in new ones for these improvements. A steel structure 78 x 71 feet was erected for covering the new hot beds, etc., which replaced those torn out. In addition to moving the mills and hot beds, etc., there was necessarily a good deal of new apparatus to be installed. A brief description of present operations at this mill follows:

After the steel ingots have been rolled in the blooming mill and sheared into blooms, they are conveyed to the Siemens heating furnaces in the rail mill and allowed to remain there until they are sufficiently hot to be rolled into rails. The rail mill, as it is now equipped, consists of three trains of rolls. On the roughing train the bloom is passed forward and backward through five passes. It is then run to the intermediate or "short" rolls, where it is given five passes in the same manner. The partially rolled rail, which has been elongated until it is now about 90 feet in length, is then run to the special cooling table, which is but a few feet to the right of the main run. This affords an interval of time between the intermediate and the finishing rolls, during which every individual rail can be brought to the same temperature, this temperature being that which has been found to produce the best results. On account of the greater amount of metal and heat contained in the head of the rail, it would be drawn in cooling into a curved shape, were it not for the precautions which have been taken. These, while very simple, are quite effective. The rail is laid on the cooling bed on its side with the head close up to the flange, or bottom, of the rail in front of it, so that the metal in the combination of two rails is about equally distributed. This allows the rails to cool gradually without causing them to become distorted. A great deal of the heat which leaves the head of the rail is absorbed in the flange of the rail adjoining it, thus keeping the temperature of the flange from being unduly lowered while the head is cooling. This is done without interfering with the rapidity or continuity of action of the mill, and it results in improving greatly the quality of the product.

After the rail leaves the intermediate rolls, it is carried by a table of live rollers and delivered to the special cooling table by means of six "dogs" or "latches" attached to ropes connected with drums on a common shaft, operated by means of a hydraulic cylinder and rack. Each of these ropes carries a second "dog," the first set of "dogs" being adapted to drawing the rails on to the cooling table and to push over all the rails then on the table, which may amount to six or more, while the second set of "dogs" is arranged to draw one piece at a time on to the feed table of the finishing rolls, thus avoiding any danger of two pieces at a time being carried forward to the rolls.

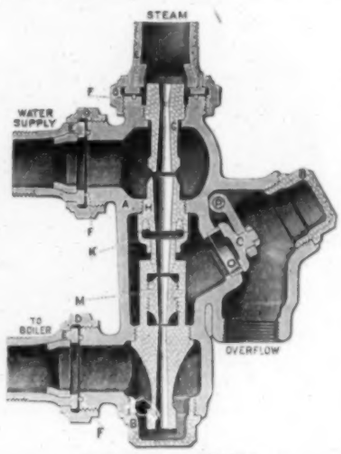
After leaving the finishing rolls, the usual processes are carried through, except that the rails do not need quite so much curving in the cambering rolls, on account of having less difference of temperature between head and flange than would be the case in the ordinary method of rolling. A great many experimental tests of various descriptions were made with this method of rolling, before it was decided to make such large and expensive changes at the Edgar Thomson Steel Works. Test pieces were taken from the heads of rails of different sections, ranging from 75 pounds to 100 pounds per yard—one rail being from a bloom rolled in the usual manner and another from the adjoining bloom in the same ingot rolled at a lower temperature. These test pieces, after being highly polished and etched, were very critically examined microscopically and photographed. We are able to reproduce photographs taken from a section in the center of the head in each case and all magnified to 40 diameters. The views on the left are those from the rails rolled at the lower temperature, and those on the right are from rails rolled in the usual manner. The rails from which the sections were photographed were rolled, in the case of each weight, from blooms made from the same ingot, the only change in the manufacture being in the variation in treatment at the rolls as described. It can be seen at a glance that the steel rolled at the lower temperature is very much finer in structure, indicating a tougher and better wearing quality of steel. The tensile, drop and other tests also showed very much better results than in the same section of rails rolled in the regular way.

Several railroad engineers and engineers of tests, in endeavoring to arrive at the proper method of controlling the heat treatment of rails during rolling have thought it advisable for them to stipulate in their specifications that the hot saw should be set a certain distance apart, sufficiently greater than the length of rails required to provide for the contraction of the steel; the rails, of course, to be cut within a certain time, say 12 seconds after leaving the finishing pass. It has been found that the necessary amount allowed for shrinkage will be reduced, at least, from 15 to 20 per cent. Capt. R. W. Hunt, of Chicago, Col. Thomas Johnson, chief engineer P. C. C. & St. L. Ry., and many other well known engineers consider this action of the Carnegie Steel Co. to be a long stride in the direction of furnishing the railroads with rails that will give them as good service as the small rails did years ago.

In the cuts on page 10, Fig. 1 is a plan view of the new cooling table at the Edgar Thomson works, Fig. 2 a side elevation and Fig. 3 a section through the cooling table.

LUNKENHEIMER AUTOMATIC INJECTOR.

The accompanying cut shows a cross-section of an injector for feeding stationary, marine or portable boilers, which has been just put on the market by the Lunkenheimer Co., of Cincinnati. It has been planned with a special aim to reduce wear, facilitate repairs and secure maximum range. The body of the injector is of cast iron, thus ensuring stiffness, and holding the tubes exactly in line. It sometimes happens with light brass body injectors that the strain of the pipe connections will badly spring the injector body. The various parts are screwed solidly to place and do not depend on pipe unions to secure them. The spillways are arranged in the connection pieces between the parts, and drilled spillholes are thus eliminated. The overflow valve has a renewable disk resting against a renewable seat. The steam tube and the



AUTOMATIC INJECTOR.

combining and delivery tube have each square end projections, so that they can be removed with any monkey-wrench. With steam pressures of 60 to 100 lbs., and water not more than 75 degrees, the capacity of the injector can be varied more than one-half.

A MODERN STEEL CASTING PLANT.

For the following description of the new steel foundry and open-hearth plant of the Shickle, Harrison & Howard Iron Co. at East St. Louis Ill., and for the accompanying illustrations, we are indebted to the *Railroad Gazette*, of New York. The company will make a specialty of cast steel parts for car construction. Uniformity of metal, simplicity in construction, the absence of rivets, freedom from corrosion, and the ability to place the metal where needed, have facilitated the introduction of cast steel in this service:

In June last the new open-hearth steel castings plant in East St. Louis was put in operation and eventually the old plant on the opposite side of the river, in St. Louis, will be closed. The new plant occupies about 17 acres of land, and when worked to full capacity will employ 1,000 men, and turn out 100 tons of finished castings a day.

One visiting it for the first time is at once impressed by the large size and substantial character of the buildings and the liberal scale on which everything is designed. Much attention has been given to the general scheme by which raw materials are brought in at one side of the main building and are passed from point to point until finally the finished product comes out on the opposite side ready for loading. Modern methods for handling material are to be seen on all sides. The large size of this plant is due to the intention of making a special line of work. A specialty will be made of cast steel car bolsters of various designs; all cast steel pedestal trucks and locomotive driving wheel centers and similar large castings used by railroads. For this class of castings the open-hearth process is considered the best adapted.

The general plan of the buildings is shown by the engravings. The frame work of the larger buildings is steel covered with corrugated iron, and the smaller buildings are brick. The main building, 340 x 340 feet, is made up of five bays. There are switching tracks on two sides and three spur tracks run into the larger bays. These yard tracks connect with a belt road, which in turn connects with all railroads in East St. Louis. In detached buildings are the power house, gas producers, machine and pattern shops, storehouses, testing laboratories and the office building; the latter also contains the drafting rooms. The material yard is on the south side of the main building near the furnaces and standard gage tracks connect this yard with the furnace platform, which is elevated about 13 feet. The raw materials are loaded in metal boxes placed on four-wheel cars, and these cars are moved about by a small switching locomotive. Gas for the open-hearth furnaces is supplied by Duff water seal producers.

On a track adjacent to the elevated furnace platform, and alongside the laboratory, is a self-registering scale which weighs each charging car. The gross and net weights are stamped on duplicate slips, one of which is filed at the scales and the other is sent to the furnaceman, who, in charging the furnaces, is guided by these weights and the analyses of the raw materials. Track scales just outside of the company's grounds are used for weighing cars shipped into or from the works.

There are four 15-ton Wellman tilting open-hearth furnaces along the south side of the main building, the furnaces being tilted by hydraulic power. On the elevated furnace platform and running in front of the furnaces is a standard gauge track

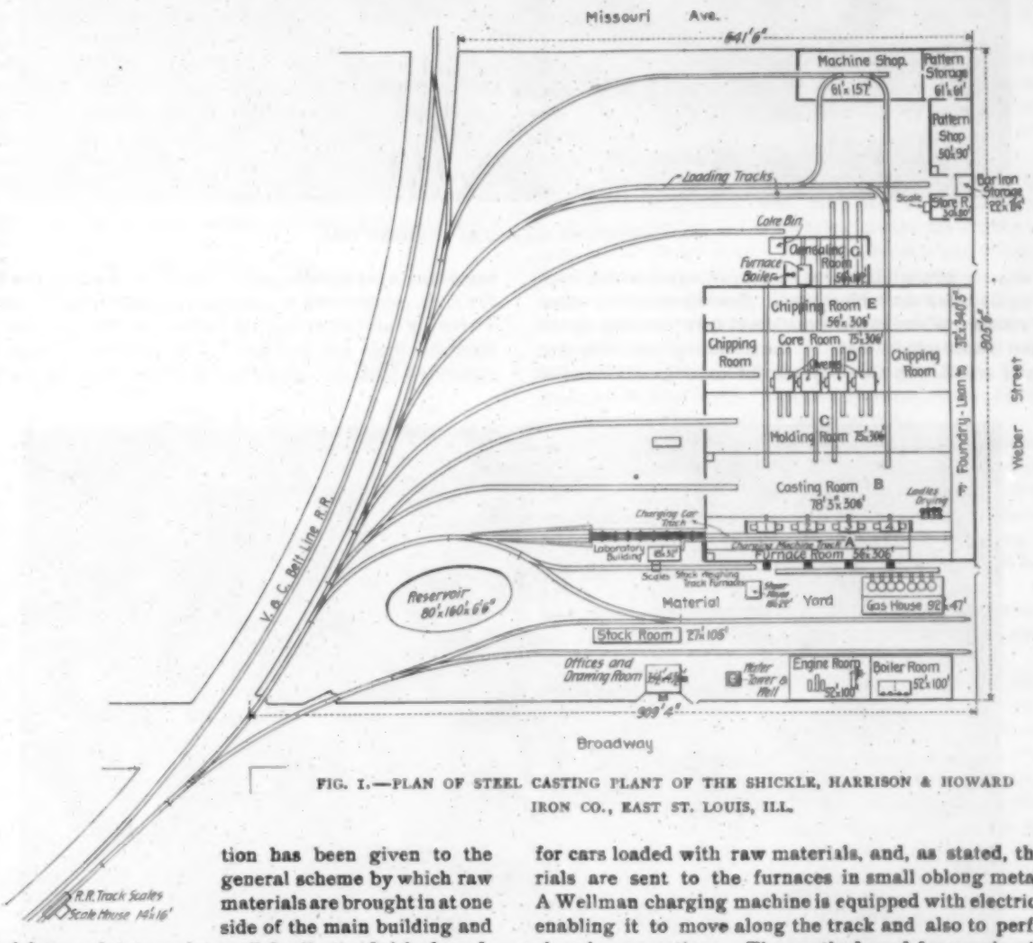


FIG. 1.—PLAN OF STEEL CASTING PLANT OF THE SHICKLE, HARRISON & HOWARD IRON CO., EAST ST. LOUIS, ILL.

for cars loaded with raw materials, and, as stated, the materials are sent to the furnaces in small oblong metal boxes. A Wellman charging machine is equipped with electric motors enabling it to move along the track and also to perform the charging operations. The method used for pouring is to run the charge into a large bottom-tap ladle which is handled by the traveling cranes in pouring the molds.

Referring to the plan, A is the furnace room; B the casting room, with three 25-ton overhead electric traveling cranes; C the molding room, with two 15-ton electric traveling cranes; D is the core room, with four double core ovens, and the space at either end is used for chipping; E is the chipping and cleaning room, rooms D and E having together 25 air hoists mounted on small overhead cranes. F is at right angles to these rooms, and is served by a 5-ton electric traveler, the space being used for storing flasks and such materials, and also for molding. G is the annealing room, containing one continuous annealing oven. All castings after cleaning are annealed and straightened. In annealing, the castings are put on cars having a fire-brick floor and the car is run into the oven, the floor of the car forming the floor of the oven.

From this description and the plan, the scheme for handling materials is evident but the principal features may be mentioned. Rooms B, C and D having switching tracks running

into them so that material such as sand can be unloaded near where it is to be used, and within reach of the cranes. Cores are made in room D between the outer shop tracks and these are placed on cars and run into the ovens. After baking, the cars are run out on the opposite side into either room C or B, both of which are used for molding. Molds made in room C may be moved by the cranes into B, and nearer the furnaces,

It will be seen that there is a through shop track between the annealing room and the machine shop, and castings intended for that shop are taken over this track. In the construction of the Ajax pedestal truck, the ends of the transoms and the bearings on the side frames are machined, and large special milling machines are used, with which all the mill work on a single piece is done at one setting. In the

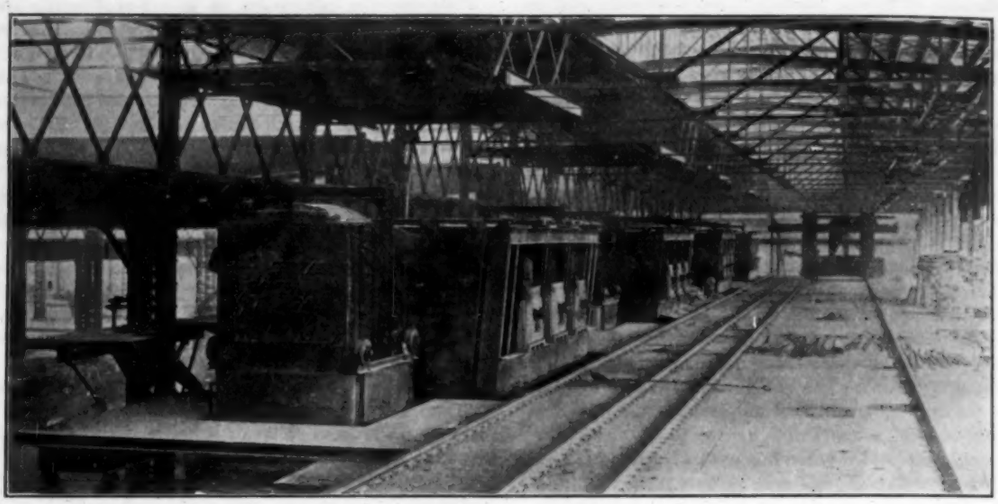


FIG. 1.—FURNACE PLATFORM, CHARGING SIDE.

or they may be poured in room C, depending on which happens to be the more convenient way. Castings made in either of these rooms are loaded on four-wheel cars running on the outer shop tracks which lead to the cleaning and chipping rooms in D and E. In this department castings are handled

same way a 14-spindle drill is used to bore all the holes for the rivet connections at one time. These large machines are driven by individual electric motors, while a number of small machine tools are grouped. The patterns storage room is separated from the adjoining shops by high fire walls. The

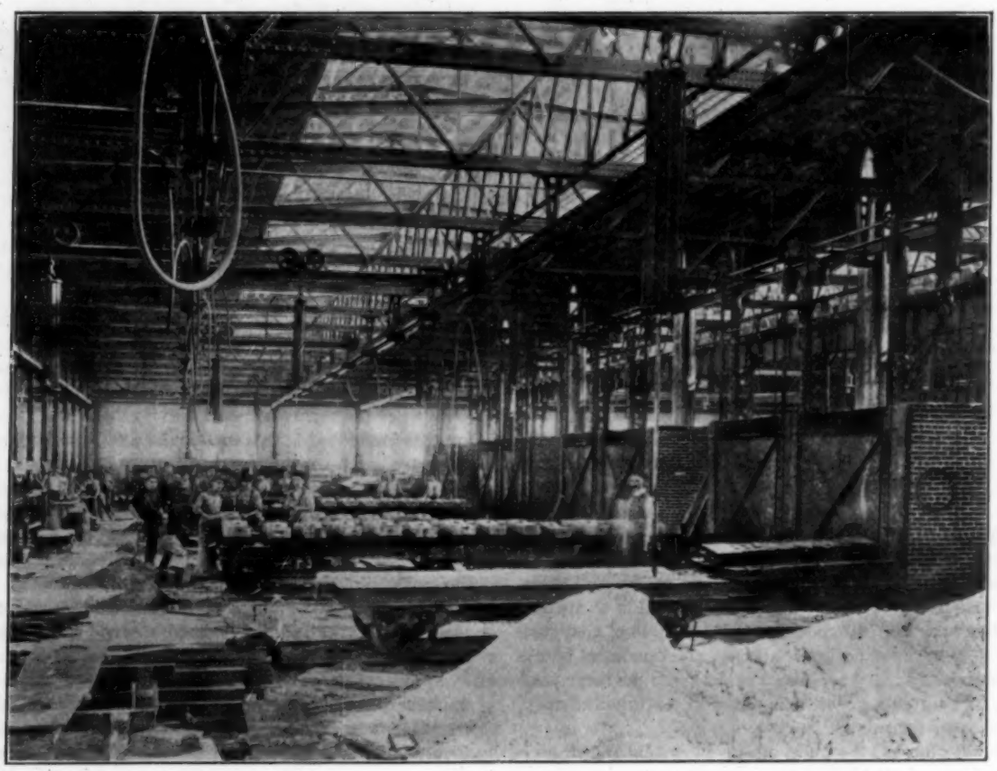


FIG. 3 —CORE ROOM.

by air hoists mounted on small overhead traveling cranes, and in this way they are delivered at the annealing oven; then after cooling they go to the paint tank, where they are dipped. From that point the castings are loaded on small push cars which are run on tracks to the loading yard. Finished material is finally loaded for shipment by a steam locomotive derrick.

tools in the pattern shop are driven by electric motors and all of the shafting is below the floor. These shops, as in fact all the buildings, are unusually well lighted and ventilated. Near the machine shop is a small detached building used for storing miscellaneous supplies, such as bolts, nuts, rivets, etc. A similar building near the furnace is a storehouse for the more valuable furnace stock which it is desired to keep under cover.

In a separate two-story building close to the furnaces are the physical and chemical laboratories. The physical laboratory is on the first floor and contains a 100,000-lbs. capacity Rhiele testing machine, and lathes and drills for preparing test specimens; these are driven by electric motors. It also contains the self-registering apparatus of the track scale previously mentioned, which is used for weighing the materials going to the furnaces. The chemical laboratory is on the second floor. The raw materials are all analyzed, and physical test pieces are also made from each heat. Four chemists are now employed in the laboratory.

The power house contains a 300-h. p. St. Louis Corliss engine direct-connected to a Western Electric generator; also there are hydraulic pumps and air compressors. The boiler and engine rooms are large and space is provided for additional boilers and engines. Electricity is supplied both for driving motors in the shops and for lighting in the several buildings and yards. All the shops are piped for compressed air and compressed air is also used to pump the water used about the plant from a deep well, the Phole air system of pumping being used.

The office building is three stories, the first floor being used for office purposes. The second floor is a large well-lighted drafting room and the third floor is fitted up for making blue-prints, and there is also a dark room for developing negatives. Also on this floor there are bath rooms for the use of the office force.

OUTPUT OF BLAST FURNACES OF UNITED STATES.*

December 1, 1900.

Location of Furnaces.	Coke and Anthracite.					Charcoal.				
	Total No. of stacks.	In Blast.		Out of Blast.		Total No. of stacks.	In Blast.		Out of Blast.	
		Number.	Weekly capacity.	Number.	Weekly capacity.		Number.	Weekly capacity.	Number.	Weekly capacity.
New York	15	2	2527	13	8857	2	2	174	0	0
New Jersey	8	3	1774	5	885	.....	.....	.....	.....	.....
Spiegel	3	3	484	0	0	.....	.....	.....	.....	.....
Pennsylvania:						13	2	123	11	500
Lehigh Valley	29	15	8537	14	5454	.....	.....	.....	.....	.....
Spiegel	1	1	80	0	0	.....	.....	.....	.....	.....
Schuylkill Valley	14	8	6450	6	2590	.....	.....	.....	.....	.....
Upper Susqu. Val.	4	3	2733	1	336	.....	.....	.....	.....	.....
Lower Susqu. Val.	9	3	3918	6	2586	.....	.....	.....	.....	.....
Spiegel	1	1	224	0	0	.....	.....	.....	.....	.....
Lebanon Valley	13	5	4288	8	7155	.....	.....	.....	.....	.....
Pittsburgh Dis't.	30	25	58093	5	8766	.....	.....	.....	.....	.....
Spiegel	1	1	1115	0	0	.....	.....	.....	.....	.....
Shenango Valley	15	7	10106	8	7793	.....	.....	.....	.....	.....
West'n Pennsylvania	21	9	12848	12	8048	.....	.....	.....	.....	.....
Spiegel	1	1	459	0	0	.....	.....	.....	.....	.....
Maryland	4	2	5074	2	2675	4	1	86	3	340
Spiegel	1	1	403	0	0	.....	.....	.....	.....	.....
Wheeling District	8	5	7271	3	4095	.....	.....	.....	.....	.....
Ohio:						6	4	294	2	160
Mahoning Valley	14	7	16647	7	9438	.....	.....	.....	.....	.....
Central & Northern	13	9	13382	4	8036	.....	.....	.....	.....	.....
Hocking Valley	2	1	609	1	2	.....	.....	.....	.....	.....
Hanging Rock	14	5	2832	9	3486	.....	.....	.....	.....	.....
Illinois	17	11	22294	6	5675	.....	.....	.....	.....	.....
Spiegel	1	1	860	0	0	.....	.....	.....	.....	.....
Wisconsin & Minnesota	6	2	2222	4	3219					
Missouri	1	0	0	1	570					
Colorado	2	2	2348	0	0	.....	.....	.....	.....	.....
Virginia	18	13	7775	5	3291	3	2	90	1	80
Kentucky	5	2	743	3	1720	3	0	0	3	200
Alabama	38	23	20449	15	9234	5	4	1232	1	100
Mich., Mo. and Wis.	.....	.....	.....	.....	.....	12	7	2612	5	2988
Tennessee	14	8	5522	6	2927	7	4	1151	3	320
Georgia	1	0	0	1	450	4	2	609	2	330
North Carolina	2	0	0	2	437	.....	.....	.....	.....	.....
New England	.....	.....	.....	.....	.....	7	3	286	4	360
Texas	.....	.....	.....	.....	.....	4	1	122	3	775
Utah	.....	.....	.....	.....	.....					
Oregon	.....	.....	.....	.....	.....					
Totals	326	179	222067	147	107761	70	32	6779	38	6153

SUMMARY.

Fuel.	In Blast.						Out of Blast.			
	Number.			Weekly Capacity.			Number.		Weekly Capacity.	
		Month Previous.	Year Previous.		Month Previous.	Year Previous.		Month Previous.		Month Previous.
Charcoal	32	30	30	6,779	7,923	7,511	38	40	6,153	5,349
Coke and Anthracite	179	171	253	222,067	207,381	289,448	147	157	107,761	110,248
Total	211	201	283	228,846	215,304	296,959	185	197	113,914	115,597

*Condensed from the *Iron Age*. The decrease of unsold stocks, so far as these are reported, was from 641,466 tons Nov. 1 to 536,636 tons Dec. 1, or about 85,000 tons.

FURTHER FROM MR. PUTNAM ON SHOT METAL.

To the Editor:

Permit me to comment on the discussion of my paper on "Shot Iron," as reported in your issue of Dec. 13 in the proceedings of the Philadelphia and Pittsburg foundrymen's associations.

I note that Mr. Pessano "believed that a large percentage of it [shot iron charged into the cupola] might be found on the roof, driven out by the blast."! [The exclamation point used here is not in the original report.] Since it is a part of my regular business to advise foundrymen how to do their work, I will here suggest that Mr. Pessano reduce the force of the blast sufficiently to insure the retention of the iron in the cupola until it shall find its way out at the tap hole. The iron melts at a point considerably above that at which the blast enters the cupola. Query: If the blast is strong enough to blow a "large percentage" of solid masses of iron out of the cupola stack, how does the molten iron escape a similar fate? Mind, I do not deny the phenomenon, but where it occurs I advise a diminution of blast pressure.

"Mr. Flagg assumed that in using the shot iron the proportion of No. 1 pig was increased, in which case the difference in cost would have to go against the use of the shot." If Mr. Flagg's assumption be granted, his conclusion will follow inevitably. But, where did Mr. Flagg get his premise. I must confess that his experience in melting shot iron, as described by himself, was calculated to discourage. And I will not deny that if I were to so charge my cupola with shot iron as to "choke it up." I should form a bad opinion, either of shot iron generally,—or of my cupola practice. (I will say, in parenthesis, that my present opinion of shot iron is rather better than it was when the paper under discussion was written, several months ago.) I am glad to note in this connection that Mr. Flagg adds that, in his experiment the shot was charged in carelessly. His experiment, then, having been conducted without skill, is no criterion.

At the Pittsburg meeting: "One of the foundrymen" stated that in an experiment which he conducted only 500 pounds of very hard, white fractured pigs was produced from 1,500 pounds of shot iron charged! He also must have used a very strong blast. He does not state what he cleaned up from the foundry roof after the heat, however. I infer that his cupola (save as to the lining) remained on its legs.

Another anonymous participant in the debate averred that the outcome of shot iron charged into his cupola was simply zero.

To offset this, and other criticisms I have to state that I charged into a small cupola, loosely, just as would be done with any ordinary scrap iron, a certain ascertained weight of shot iron, and the product (including about 5 per cent of the charge, recovered from dump, after the heat) was 90 per cent of the charge. Every day now, and for many months past, I have been using all of the shot iron made in all the processes of our founding, without the slightest increased cost of pig iron used in the mixture, and have never, save on one occasion, had any trouble from hardness, or other physical or chemical fault, in the product. On the occasion excepted, it developed that the fault lay in the No. 2 foundry pig.

With regard to the price that I credited to shot iron, I will say that my paper was written long ago, and had been lying in the hands of the associations for reading in its turn. At that time we had just closed our season's work, and had not gone into the market for this year's supply of stock. Much of last year's stock of pig iron brought considerably more than $20 per ton. Under those conditions, and the shot iron yielding 90 per cent, and being used without changing per cent of pig iron and scrap, and without employing a higher-priced pig, it seems to me that the shot was worth about as was stated. Today, it is not worth so much, of course. But that is a fault of the market, and not of the shot iron.

Moline, Ill., Dec. 14. E. H. Putnam.

In the last issue of *Graphite* the Joseph Dixon Crucible Co. calls attention to the use of flake graphite in an ordinary squirt can. "Where the coarser flake is used the opening in the nozzle of the can may require enlarging. Only a dry can should be used. A can that has had oil in it will clog the graphite."

BLAST FURNACE GASES IN GAS ENGINES.*—II.

BY PROF. JOSEPH W. RICHARDS.

In order to discuss the application of this great economy to American blast furnace practice, we must confess, to start with, that not one single example can be yet cited. Why this is so is hard to surmise; many reasons, or, rather, excuses, may be advanced; possibly our iron works have been so busy making money during the last two years that they have had no leisure to consider the question fairly and on its merits. European practice, to start with, provides us with all the data necessary for discussing the question of applying this improvement to American blast-furnace practice. To bring out the great saving of power possible under the different conditions which may prevail in different localities and in different practices of driving furnaces, I have calculated the minimum, the average and the maximum surplus of power which may be obtained by replacing our present boiler and steam engine plants by gas engine plants. The calculations are all made on the basis of a production of 100 metric tons (98.57 long tons) of pig iron produced per day.

Case I.—To find the minimum surplus power. Let us assume:

(1) A poor gas, ratio CO_2 to CO = 3 to 5 (by volume), with the composition by volume—

CO_2	15
CO	25
H	2
CH_4	1
N	57

(2) A very low fuel consumption of 700 kilos per ton of iron (1,550 pounds).
(3) A high temperature of the blast, 700° C.
(4) The requisite quantity of blast supplied at a maximum pressure of 1.33 atmospheres (nearly 20 pounds per square inch).
(5) The hot blast stoves to have a minimum efficiency (50 per cent) and therefore to take away a maximum proportion of the gases.

Case II.—To find the average surplus power. Let us assume:

(1) An average gas, with CO_2 to CO = 1 to 2, by volume, and composition by volume—

CO_2	12
CO	24
H	2
CH_4	2
N	60

(2) An average fuel consumption of 900 kilos per ton of iron (2,000 pounds per long ton).
(3) An average temperature of blast, 550° C.
(4) The requisite blast supplied at 0.67 atmosphere (10 pounds per square inch).
(5) The hot-blast stoves to have average efficiency (65 per cent).

Case III.—To find a maximum of surplus power. Let us assume:

(1) A rich gas, with CO_2 to CO = 1 to 5, by volume, and composition by volume—

CO_2	6.0
CO	30.0
H	0.5
CH_4	0.5
N	63.0

(2) A maximum fuel consumption of 1.045 kilos per ton of pig iron (2,400 pounds per long ton).
(3) A minimum temperature of blast, 400° C.
(4) The requisite blast supplied at a minimum pressure, 0.33 atmosphere (5 pounds per square inch).
(5) The hot-blast stoves to have a maximum efficiency (80 per cent).

We shall then obtain by the proper calculations the results shown in Table A as to the surplus power obtainable by using boilers and steam engines on the one hand, or gas engines on the other.

Remarks.—The surplus of 1,090 horse-power obtainable in Case I is obtainable, according to the assumptions made, when all the conditions are the most unfavorable for the generation of power from the gases. These assumptions agree with the best modern practice in all points except the last, i.e., the minimum efficiency of the stoves. It needs no argument to prove that a plant using the minimum of fuel and maximum temperature and pressure of blast would be necessarily a plant with stoves of the most approved type and efficient working. If we were to make this one change in the assumptions, and assume that instead of using stoves with an efficiency of only 50 per cent, there were used modern stoves of 75 per cent efficiency, there would result a theoretical development of 2,780 horse-power in the gas engines, or a surplus above that required for the furnace itself of 2,140 horse-power. This, then, is the final estimate of the minimum surplus power to be obtained from a modern blast furnace running on the most economical conditions as regards the production of pig iron—reckoned per 100 tons of pig iron daily.

Case II gives a figure which applies, not to the latest type of furnace practice, but to the average type of furnace making

TABLE A.

	Case I.	Case II.	Case III.
Volume of gases per 100 k of iron in m³	307	404	503
Calorific power of gas per m³	900	953	986
Calorific power of gas per 100 k of iron	276,300	385,012	495,958
Assume 10 per cent lost by leakage	27,630	38,501	49,596
Net power of remaining gas	248,670	346,511	446,362
Weight of blast in kilos, per 100 k of pig iron	312	388	462
Volume of blast, in m³, per 100 k of pig iron	241	300	357
Heat units in the blast	80,210	60,900	48,302
Heat to be supplied the ovens	160,460	93,700	60,450
Net calorific power of the gas left over for boilers or gas engines	88,210	252,810	385,910
Equivalent horse-power of above gas, at an efficiency of 100 per cent, expressed per 100 tons of pig iron produced daily	5,770	16,500	25,200
Indicated horse-power developable by gas engines using this gas at an efficiency of 30 per cent	1,730	4,950	7,560
Indicated horse-power necessary for furnishing the blast, plus 10 per cent for hoisting, pumping, etc.	640	460	270
Surplus indicated horse-power, using gas engines, per 100 tons of pig iron produced daily	1,090	4,490	7,290

100 to 200 tons of iron per day—such furnaces as represented good working 20 years ago, and many of which are in operation yet east of the Alleghenies.

Case III represents a figure which is approximated by small, old-fashioned furnaces with a high fuel consumption—in other words, average practice of 30 or 40 years ago. The one exception to be taken to this statement is that the stoves are assumed to have a maximum efficiency. If they have a minimum efficiency, the figure would be cut down some; but it is only a rough approximation at the best, and an actual illustration to be given will show that it is not higher than has occurred in actual practice.

To prove the correctness of these general conclusions, it will be interesting to check the figures as to horse-power by calculating the power actually raised by steam boilers and engines, and seeing if this coincides with actual results of practice. To do this we will take the surplus gas and assume it thus converted into mechanical power, at a total efficiency of 3 per cent (average poor practice), 6 per cent (average good practice) and 12 per cent (best attainable practice.

		Case I (*a*).	Case I (*b*).	Case II.	Case III.
Horse-power of gases per 100 tons of pig iron daily, at 100 per cent efficiency		5,770	9,260	16,500	25,200
Indicated horse-power necessary for running the furnace per 100 tons daily		640	640	460	270
(1)	Indicated horse-power by steam power at 12 per cent efficiency	690	1,110	1,980	3,000
	Surplus power, on this assumption	50	470	1,520	2,730
(2)	Indicated horse-power by steam at 6 per cent efficiency	345	555	990	1,500
	Surplus power, on this assumption	[−295]	[−85]	430	1,230
(3)	Indicated horse-power by steam at 3 per cent efficiency	170	280	495	750
	Surplus power, on this assumption	[−470]	[−360]	35	480

Case I (a) represents Case I of the previous calculations, i.e., best modern practice with poor stoves. Case I (b) is the modification which considers best modern practice, using good efficient stoves.

The figures of assumption (1) above are highly theoretical, inasmuch as they represent the very best attainable practice with the best engines and boilers, kept up to their highest efficiency. These figures parallel those of Mr. Gordon, calculated on this assumption, contained in his paper in the *Iron Age* of Oct. 18, 1900. Considering the difficulties of blast fur-

*Read before Chemical Section of the Franklin Institute, Philadelphia and reprinted from the Journal of the Institute.

nace practice, they are an unattainable ideal. They show a moderate surplus in the case of best modern practice, and a large surplus of 1,520 horse-power in the case of average practice. The figures of assumption (2) really represent nearly the best of modern furnace attainment. They show just about sufficient power raised to run the furnace in good practice with low fuel consumption, and a modest surplus of 430 horse-power in average practice. The assumption (3) is nearer the average of small blast furnace steam plant efficiency, and shows a decided deficit of power for good running with low fuel consumption, and just barely sufficient power in the average running.

We will close by making some specific applications of these calculations to actual American practice, in order to check off the general reliability of the conclusions so far stated.

Case III.—As an interesting illustration we will take the working of a small spiegeleisen furnace in Eastern Pennsylvania, which, as far as fuel consumption and general efficiency is concerned, will represent fairly well the conditions of our case, and may be taken as typical of the features of the small furnace of fifty years ago.

CONDITIONS.

Composition of gas by volume:

CO_2	3
CO	33
H	2
N	62

Spiegel produced	6,818 kilos daily.
Fuel used	29,000 "
Flux used	19,500 "
Carbon in spiegel	4 per cent.
" fuel	85 "
" flux	11 "
Efficiency of stoves	30 " (iron pipe stoves).
Gas lost by leakage	10 "
Pressure of blast	0.75 kilos per c.m.² (11 pounds per in.)

RESULTS OF CALCULATIONS.

Calorific power of gas	1,052 calories per m³.
Volume of gas per day	137,204 m³.
Calorific effect "	144,338,000 calories.
Required to heat blast, per day	50 000,000 "
Indicated horse-power of engine and pump	150

CONCLUSIONS.

Calorific effect of gases, per day	144,338,000 calories.
Lost (10 per cent)	14,433 800
For heating blast	50 000 000
	64,434,000 "
Surplus for burning develops	79 900,000 "
Horse-power at 100 per cent efficiency	5 200 horse power.
Developable by steam at 3 per ct. efficiency	165 "
" by gas engines at 30 p. ct. efficiency	1,650 "
Surplus power using steam	15 "
" " gas engine	1,500 "

Remarks.—This little furnace barely raised enough steam power for its own needs. Using gas engines, there would have been a surplus of 1,500 horse-power, which is at the rate of 22 000, horse-power per 100 tons of product per day. This 1,500 horse power would be sufficient to supply all the power needed in the works to which the furnace is attached, and save at least $50 worth of coal per day. It is to be understood that this furnace is an extreme case, and is cited simply to illustrate the general correctness of the conclusions of Case III.

Case I. (b).—We will present an example of very good modern practice, with exceptionally low fuel consumption (leaving the average case to the last because of its greater relative importance). The data are from a paper by J. Whiting, in the Transactions of the American Institute of Mining Engineers, June, 1891, and concern a furnace of the Illinois Steel Co., in South Chicago. The gases were exceptionally poor, the ratio CO_2 to CO by volume being 2 to 3, and the fuel consumption only 750 kilos per ton of pig iron (or 1,680 pounds per long ton).

CONDITIONS.

Composition of gas by volume:

CO_2	15.7
CO	23 5
H	1.2
N	59.6

Pig iron produced daily	130 tons.
Fuel used per 100 kilos of pig iron	75 kilos.
Carbon in fuel, 100 kilos of pig iron	64 "
Carbon in 100 kilos of pig iron	3 75 "
Efficiency of stoves	70 per cent.
Efficiency of boilers and engines	5 "
Volume of blast per minute	247 m³.
Pressure of blast	0 75 atmosphere.
Temperature of blast	850° C.

CALCULATIONS.

Calorific power of gas per m³	743
Volume of gas per 100 kilos of pig iron	332.5 m³
Calorific power of gas per 100 kilos of pig iron	247,000 calories.
Required to heat blast, per 100 kilos of pig iron	125,854 "
Indicated h. p. of engines per 100 kilos of pig iron	220 horse-power.

CONCLUSIONS.

Calorific effect of gases per 100 kilos of pig iron	247,000 calories.
Lost (10 per cent)	24,700
Heating blast	97 070
	131 770 "
Surplus for burning can develop	115,230 "
Surplus develops per 100 tons iron per day,	115,230,000 "
Horse-power, at 100 per cent efficiency	7,530 h. p.
Horse-power by steam at 5 per cent efficiency	375 "
Surplus power per 100 tons output daily	155 "
Developable by gas engines at 30 per cent efficiency	2,260 "
Surplus power per 100 tons output daily	2,040 "

Remarks.—This result is 100 horse-power less than the minimum before calculated, but a large allowance of 10 per cent has been made here for loss, and a reduction of 1 per cent in this item would increase the surplus power 160 horse-power. The great loss of gas occurring during charging and by leakage is an item which is being rapidly reduced by economical managers.

Case II.—To illustrate this case, that of average blast furnace practice, we will take the data from a blast furnace plant in Eastern Pennsylvania, which is making in three furnaces 2,600 tons of pig iron a week.

CONDITIONS.

Composition of gas by volume:

CO_2	9
CO	27
H	1.8
N	62.8

Pig iron produced daily	370 tons.
Fuel used per 100 kilos of pig iron	100.0 kilos.
Carbon in fuel, 100 " "	82.9 "
" flux, 100 " "	4 6 "
" 100 " "	3 1 "
Efficiency of stoves	60 per cent.
" boilers and engines	4.5 "
Pressure of blast	1.3 kilos per cm² (20 pounds per square inch).
Temperature of blast	555° C.

CALCULATIONS.

Calorific power of gas per m³	873 calories.
Volume of gas per 100 kilos of pig iron	434 7 m³.
Calorific effect of gas per 100 kilos of iron	379,400 calories.
Required to heat blast, per 100 kilos of iron	90 500 "
Indicated horse-power of engines for blast	950 horse-power.
" " " " hoist, pumps, etc. (per 100 tons of iron daily)	65 "

CONCLUSIONS.

Calorific effect of gases per 100 kilos of pig iron,	379,490
Lost (10 per cent)	37,950
For heating blast	90,500
	128,450 calories.
Surplus for burning develops	251,000 "
Surplus per 100 tons of pig iron daily	251,000,000 "
Horse-power, at 100 per cent efficiency	16,400 h. p.
Horse power with steam, at 4½ per cent efficiency	738 "
Deficit of steam power, per 100 tons iron daily	277 "
Horse-power with gas engines, at 30 per cent efficiency	4,920 "
Surplus power with gas engines (per 100 tons daily)	3,900 "
Deficit of steam power per 370 tons daily	1,025 "
Surplus of gas engine power per 370 tons daily	14,400 "

Remarks.—It is an actual fact that, at the works in question, the three blast furnaces are charged with 800 horse-power, furnished to them by the boiler plants fired by coal. It is also a fact that nearly 10 000 horse-power is raised for the rest of the plant by coal fired boilers, and that all of this could be supplied by gas engines utilizing the blast furnace gases. The saving in the coal bill alone would amount to at

least $150,000 in one year. The gas engine plant to accomplish this would cost $500 000.

I have chosen to conclude with this case in order to leave an adequate impression of the great industrial revolution which is imminent in the economical utilization of blast furnace gases.

THE PROSPECT FOR INDUSTRIAL PEACE.*

BY ROBERT H. JEFFREY, OF JEFFREY MFG. CO.

In these days when almost every avenue of thought or handicraft has been pursued so far, a man can scarcely hope to reach a high state of proficiency, either in the direction of thought or physical activity, unless he seize upon one particular branch and follow it zealously to the end of his days. If his mind is not fixed with a singleness of thought upon that one path, his energies are apt to become scattered and his efforts proportionately feeble.

My own efforts have been almost wholly devoted to the business in which I am engaged and I feel that in endeavoring to treat a subject of such magnitude, the lantern of my knowledge can shed but a few scattered rays. Nevertheless there are such potent signs of the time when the olive branch of peace shall rule over our industrial world that I feel you will all agree with me that it must indeed be a dull perception that has not already absorbed some substantial hope for the future. It might also be maintained that the study of industrial conditions is nowadays equally an element of business education and in a measure essential also to success as is a knowledge of commercial paper or of book-keeping. Business has become a science. No matter to what line of work you turn you find special aptitude, special training or both necessary to keep pace with your competitions and your competitors. It is competition that has brought about the present acute state of proficiency and it was competition also which caused our workingmen to band together into unions for self protection. It is competition that has caused the majority of the large combinations of capital and it seems likely also that competition between capital and labor for supremacy in the industrial world will bring about the final adjustment for which the business of all countries is yearning. This adjustment will be a combination, a trust if you please, not in the abused meaning of the word, but a trust in one another and the recognition that from beginning to end, from a utilitarian point of view as well as a humanitarian, there is a community of interests between employer and employee. This view to many may appear visionary but I assure you that it is founded upon a concrete doctrine and the degree of rapidity with which it is being instilled into the minds of capital and labor alike is one of the amazing signs of this generation.

The Division Between Master and Men.

Looking back over the history of the relations between man and master it is easy to see how they have drifted into separate channels of thought and supposedly into distinct interests as well. Long years ago, before machinery filled our shops, industries were small and the employer of a few men worked side by side with his workmen. The conditions to which both were subjected were the same and their interests were, without doubt, common interests. But the business grows, more men are employed; the employer of a few changes into the manager of many. He begins to see the need of discipline to maintain control, and so holds himself more and more aloof. In the meantime the man in the shop is losing his identity. He no longer calls his employer by his first name, he no longer is an all-around man about the shop. His work is confined to one machine and perhaps even to one operation of that machine, year in and year out. The monotony of the life is dulling his perception. From an all around mechanic he is becoming a part of a machine, a mere mechanism without the power to see clearly what has changed his conditions nor how he may remedy them. This, I may say, is not yet generally true, but I do emphatically state that such is the modern tendency. The employer has forgotten that he was once a laboring man; he has lost sight of the fact that the man under him was once his fellow workman. He has allowed his chase after the mighty dollar to warp his judgment and to sear over the comradeship of his former days. His employee feels this He appreciates that his grip is growing slack. He knows that his employer in his struggle for gain has for the moment at least forgotten him. And from these conditions has come into the mind of each the heresy that the two interests are antagonistic. They have surely drifted into separate channels of thought and action and the interdependence of their relations lies covered with the dust of neglect. They may continue to drift for some time to come but there is a limit beyond which they cannot continue to separate; and from the moment that elastic limit, so to speak, is reached, the thought of each is once more made introspective and the truth from within will gradually shed light where darkness had formerly reigned.

Growth of Organization Among Workmen.

As the paths between capital and labor have widened in this process of alienation which I have described, the bond between laboring men has been more closely cemented to a corresponding degree. Capital was too often forgetful of the tool called "labor," which was such a potent factor in the production of wealth, and time and time again was labor called upon to declare what in these more enlightened days are becoming recognized as common rights. Here was a common cause to bring them together. As individuals their wishes and even many of their needs were overlooked, but as a body of men, controlling to a degree the output of a trade, they possessed a leverage upon capital which required due consideration. Trade after trade has been organized in this manner, until today there is no line of business however small which does not feel the weight of their "demands." Protection was the first and cardinal principle aimed at by union labor, protection against the oppression of the unscrupulous in their forgetfulness of their fellow beings. But the social features were no small inducements to bring men together; and thus the feeling of brotherhood which for the time being their employers had forgotten, became a great factor in the formation of trades unions.

To a certain degree, therefore, it must be admitted that the employing class is largely responsible for this phase of the industrial issue The phenomenal growth and prosperity of our country has resulted in a proportionate advance in strength and numbers of organized associations of workingmen. The periods of business depression have been so few and booming stages so great and powerful that labor has had unusual opportunities to make its demands upon rising markets and employers have had little time to refuse. Great power suddenly or newly acquired, whether it be in the form of wealth or influence is like a little knowledge, a very dangerous thing. So the sudden accession to power in our labor unions has proved in many instances—not all, I am thankful to say—the means of pushing them beyond the point at which their usefulness must end and into the province where their counsels and actions can bring them no advantage but must result rather in antagonism to employer and in a waning influence for the unions themselves.

Abuse of Labor Union Power.

Such was the condition of the labor market in this country but a few years since. Strike succeeded strike, mob followed mob, unions in many instances having degenerated into organized mobs for the intimidation of those who were not of their number and for the suppression of the instruments of law and order. Acts were committed at these times and for political reasons were countenanced by officers of the law, which would have resulted in prompt punishment of single individuals. But the unions wielded great power; their votes would put many a man into office, and acts committed by their numbers must be connived at. Here we find the abuses not the uses of organized labor. The leadership of the majority of unions is, I believe, in the hands of intelligent and well-meaning men, but they have often proved wholly inefficient to control the ignorant and prejudiced mind of the members. Passion has swayed their action and reason for the time being has been swept to the winds.

Employers have awakened with surprise to the conditions as they exist. The forgotten workingman, though neglected for the time, still remained a thinking being and has found effective means of making himself felt. It was at once seen that protection was needed, protection against the encroaching power of labor. As the men had been compelled in the

*Read before the Engineers' Club of Columbus, O., Dec. 15, 1900.

first place to band themselves together against the oppression of unwise or unscrupulous masters in order to preserve the rights, which are highly prized by all men, so finally the employers, for the sake of self-preservation, have been driven into unions of their own in order to oppose the power of labor unions with a correspondingly powerful organization. At the present time wherever you find a trade well organized among the workingmen you will find a similar union of the employers. This condition is one of armed neutrality. The great countries of Europe all consider that in order to maintain peace they must have large armies, so that their neighbors will consider seriously before engaging them in conflict. When each respects or even fears the strength of the other, differences which will arise are more apt to be settled by reasonable argument than by coercion and force of arms. So the great strength of industrial capital and labor stand for peace more than for war. They render possible the making of agreements looking to a proper adjustment of trade questions and they have, through their strength, the means of carrying out such agreements.

In this manner we approach a balance or equilibrium of power and make a long step toward the adoption of reason as the arbiter of industrial disputes. Both men and employers appreciate the futility of attempting to adjust their relations equitably and satisfactorily with the rule that the strongest shall win, regardless of justice or right. They both realize that earnest efforts must be made to avoid the terrible industrial conflicts "which are as harmful to the industries of the country as war is harmful to its finances." Some idea also is gaining ground of how the great scars which this sort of strife leaves upon the smooth surface of our democracy endangers the fundamental institutions of our land and threatens through the class feeling so engendered to bring on an increase of anarchy and tyranny.

The Formation of Manufacturers' Unions.

The labor unions have compelled the manufacturers to adopt their own tactics and so manufacturers' unions have been formed as protective measures against the encroachments of labor. The most prominent of these associations, formed purely to deal with industrial questions are, the Stove Founders' National Defense Association which deals entirely with the stove molders, the National Founders' Association dealing with molders and core makers in general foundry work, and the National Metal Trades Association which is composed of manufacturers employing pattern makers, blacksmiths, sheet metal workers and machinists. Since the formation of these organizations strikes are becoming less and less frequent in the trades involved and there is a strong and growing sentiment that the strike is at best a measure to be resorted to only when every other resource is exhausted.

Up to nine years ago, the industry represented by the Stove Founders' National Defense Association was yearly torn by disastrous strikes. The men could not be depended on and in fact felt that it was their duty to think of themselves and for themselves alone, forgetting in their turn what the employers had previously forgotten, that the interdependence of employer and employee is so close that neither can suffer without seriously involving the other. Finally conditions had reached a crucial tension. Both sides had wearied of the useless struggle. At this crisis an agreement was formed which made it possible for their representatives to meet representatives from their men and formulate some rational basis upon which to work. The first article of the agreement they adopted is an accurate portrayal of the conditions which had existed, and with your permission I will quote it:

"There has heretofore existed a sentiment that the members of the Stove Founders' National Defense Association and the members of the Iron Molders' Union of North America were necessarily enemies and in consequence a mutual dislike and distrust of each other and of their respective organizations has arisen, provoking and stimulating strife and ill will, resulting in severe pecuniary loss to both parties. Now this conference is held for the purpose of cultivating a more intimate knowledge of each other's personality, methods, aims and objects, believing that thereby friendly respect and regard may be engendered and such agreements reached as will dispel all inimical sentiments, prevent further strife and promote the material and moral interests of all parties concerned."

Here you have an illustration of what, to my mind, represents the ideal basis upon which business should be conducted. The desire to make business profitable is given due consideration, but in gaining this necessary point the employer recognizes the humanity of his employees and stands before them as an arbiter of good will rather than of evil. His attitude toward them is not one of grinding down but of lifting up to a level which permits him to be friends with his men and they with him. The other two unions of employers have secured somewhat similar agreements with the labor organizations with whose members they deal, but nothing quite so effective in eliminating strikes and lockouts. These agreements are promising, they represent reason on the way to become the controlling power in industrial disputes. But these unions of employers and employees have only been successful in carrying out their agreements according to the degree of intelligence possessed by the leaders and counsellors on both sides. As long as strike or lockout is possible they will be used as instruments to force compliance with the wishes of one or the other side, as soon as conciliatory methods have been exhausted. As long as civilized and enlightened nations will fight in men's blood for territory or for a position right or wrong, we can expect individuals or bands of individuals to stand and fight for right and privilege which they hold equally dear. We are not likely to have peace and good will with our neighbors if we have strife among ourselves, and our strikes are a very disastrous form of civil war in many instances.

Costliness of Strikes.

During the period of eight years from 1886 to 1894 our labor statistics as compiled at Washington show the total number of strikes to have been 10,487, with a loss of wages to men of $111,992,934 and a loss to employers of $51,888,233 making a total of $163,881,167. Of this startling total you will see that 111 million dollars loss fell upon the workingman as against about 52 millions to the employer or considerably more than two-thirds upon the shoulders that are least able to bear it. In looking over available statistics I find this is the general rule. So it is evident that the laboring men have been fighting a losing battle in one sense of the word. In another sense they have gained. The manufacturers, their employers, as a class are now generally willing to recognize their right to a hearing and to grant reasonable requests.

Look for a moment, however, at the cost at which this condition has been arrived at—164 millions to the direct participants, while we are unable to estimate the real and actual cost to the communities in which these disturbances occurred, to say nothing of the hatred and bitterness which are the inheritance of such an abortive state of society. As long as men have passions stronger than judgment, as long as strikes and lockouts are possible at all, so long will they exist as a menace to public weal and public good. Several means, more or less practical, have been vouchsafed as cures for these conditions among them are:

1. Prohibition of strikes and lockouts by law, making public arbitration compulsory, thus keeping industrial forces at work pending settlement of disputes, at the same time giving the laboring man a full hearing and adjustment of his grievances.

2. Bringing to the employer and employee both a complete realization of the community of interests between them by establishing working agreements making arbitration purely voluntary. The chance for the complete success of this method is remote, but its degree of success is dependent upon a thorough campaign of education.

3. The system combining elements of both the former methods, which might be called a voluntary compulsory plan. The employer cedes his privilege of establishing a lockout in consideration of his employees agreeing not to strike, and at the same time agrees to arbitrate before a suitable tribunal the grievances of the men. Here we have man and master meeting upon common ground. Each has given up a point to break down the barrier between them, which has for so long been prejudicial to the interests of both. Where reason reigns harmony will always prevail.

This is the solid foundation upon which the new labor union in Columbus is building, a foundation upon which I feel they can build a structure which will stand as a permanent monument to industrial peace and which will, through the forward

step thus taken give an example to the rest of the world which will result in incalculable good. Here we have the germ of the solution of the question and in the Machine Trades and Professions Association we approach more nearly to a permanent adjustment of the great labor problem than ever before. All hail to the workingmen who have made this step possible and may continued success attend the efforts so favorably begun.

Just a month ago the National Founders' Association, assembled in convention in New York, representing the management of over 400 foundries in the United States, adopted the following resolution in favor of the new organization:

WHEREAS, Certain mechanics in the city of Columbus, Ohio, have formed a union called the Machine Trades and Professions Association; and

WHEREAS, The fundamental principles of this organization are: 1. The moral, intellectual and social advancement and enlightenment of its members. 2. The recognition of a community of interests between employer and employee. 3. That all strikes are antagonistic and drastic measures, calculated to arouse opposition, bitterness of class feeling, rather than a just and equitable adjudication of differences between employer and employees; and

WHEREAS The Machine Trades and Professions Association has unequivocally renounced the strike as a measure of defense, and does so declare and bind its members in its constitution, requesting at the same time that employers shall, in view of this attitude of friendliness, moderation and consideration, give their grievances a prompt and ready adjustment by means of arbitration; and

WHEREAS, The National Founders' Association believes that these principles are eminently proper ones and a decided step toward more harmonious relations between labor and capital; now, therefore, be it

Resolved, That the National Founders' Association heartily commends the spirit of progress, fair-mindedness and broad attitude of reason and justice which the Machine Trades and Professions Association has assumed toward the grave industrial questions now agitating this country. Be it further

Resolved, That a copy of this resolution be sent to the secretary of this organization at Columbus, Ohio.

In conclusion I may say that education is the fundamental principle upon which we must base our cure for the evil of strike, lockout, and class prejudice between employer and employee. We all need to be taught that because our arm is stronger than our neighbor's that we are not, onthat account, necessarily in the right. The American spirit of fair play has not yet been submerged by the commercial spirit of the age nor by the selfishness which comes from it. Our minds are still open to reason. There are brighter prospects than ever that, though the greatest commercial and industrial nation in the world or in the world's history, we are not on that account so sordid as to exclude the finer influences which are the root of all true greatness.

PRESIDENT E. O. HOPKINS, of the Sloss-Sheffield Steel & Iron Co., who has been in New York recently attending the quarterly meeting of the company's directors, reports orders on the company's books for 78,000 tons of pig iron, of which 50,000 was booked in November. At the Sheffield property one furnace has been put in operation and two others will be available when needed. These furnaces will receive brown ore from the Russellville mines recently acquired. The cost of ore at the furnaces, under mine ownership is 60 to 75 cents a ton as against $1.50 formerly. The report for the quarter ending Nov. 30, as presented at the New York meeting, showed a surplus of $451,435 after the payment of dividends.

THE vessels built in the United States and officially numbered from June 30 1900, to Nov. 30, 1900, were 495, of 149 963 gross tons. These include seven steel steamships on the Great Lakes (34 933 gross tons), and four smaller steamships (8,456 gross tons, which could pass through the new Welland Canal), and one steel schooner barge (2,790 tons).

STEEL CASTINGS BY THE TROPENAS PROCESS.

Heretofore the vast majority of small castings have been supplied by the makers of semi-steel or crucible steel. The former metal does not have the properties of steel and the latter is more expensive, while both processes necessitate considerable time for the turning out of even moderate sized orders. By the Tropenas process it is possible to manufacture small steel castings of excellent quality, machine molded wherever possible, and the larger the order the quicker the delivery in proportion. These castings do not require annealing and consequently the day after the pattern is received at the foundry it is possible to turn out a day's work, running from one to several hundred pieces, and the day thereafter the castings may be cleaned and are ready for shipment.

Since March, 1900, the Sargent Co., of Chicago, has operated a plant at Chicago Heights, Ill., manufacturing small steel castings and making the steel by the Tropenas process. This method was adopted after several years experience with open hearth and crucible steel plants, and after a careful study of the subject of steel making at home and abroad, where the process is in successful operation in some 40 different plants. The Tropenas process consists in the use of special converters in which pig iron and selected scrap, previously melted in a cupola, are subjected to an air blast of 3 to 4 pounds pressure per square inch, directed horizontally across the top of the molten bath. This action generates intense heat by the combustion of the metalloids in the pig iron, and after a period varying from 16 to 20 minutes, depending on the quality of the charge used, there remains in the converter a bath of nearly pure iron. Addition is made of ferro-manganese or ferro silicon, or both, to bring up the silicon, manganese and carbon contents to the specified proportions, when the metal is drawn off into a ladle and poured. The process is simple and the product very regular.

STEEL CASTINGS BY THE TROPENAS PROCESS.

The peculiar advantage of the Tropenas process is found to be in the fact that the resultant metal is much hotter and consequently more fluid than that produced by other methods, and it is this fact which makes it valuable in the manufacture of small and intricate castings, as it can be poured over the lip of the ladle in as small a stream as desired, and will run through thin sections, producing solid castings free from pin holes and cracks. Any grade of metal is readily produced by varying the additions. It is consequently valuable not only in the production of low carbon steel of the maximum permeability, so much desired in electrical castings, but also in the production of special grades of hard steel for mining machinery parts and other purposes.

The plant at Chicago Heights is in successful operation, producing from 20 to 30 tons of castings per day, with a much larger capacity. All classes of general machinery, railroad, mining and electrical castings are turned out, equalling in physical properties and chemical composition the best open-hearth steel. The castings are sound and solid, with a smooth

surface, and the metal will stand forging and welding. Miscellaneous castings, unless otherwise specified, are made of mild steel which is tough and machines readily, having a tensile strength per square inch of from 65,000 to 75 000 pounds, with an elongation of 20 to 30 per cent. The accompanying illustration shows a few of the castings made of Tropenas steel. They are solid and true to pattern, equaling in every respect forgings of all kinds, which they are intended to replace, as they can be furnished in less time and at a lower cost, especially where special dies and appliances for forgings are made.

Wherever possible all patterns are molded by machinery, which insures uniformity. All kinds of work in the shape of special castings for automobile construction, general railroad, mining, electrical and machinery parts, where lightness and strength are desired, can be made in Tropenas steel equal in all respects to forgings. At the plant at Chicago Heights the iron foundry has two cupolas capable of melting 60 tons of metal a day, and in the steel foundry are three Tropenas converters, each having a daily capacity of 24 tons of steel. The departments are in two buildings, side by side, with an open court between, except at one end, where a building at right angles connects the two. Each building is 200 feet long, and the space between is utilized for shipping and shop tracks. All machinery is operated either by electricity or compressed air. The casting floor of the steel foundry is 50 feet wide and is served by two electric traveling cranes of 15 tons capacity each. A single cleaning room serves both foundries. Oil is used for fuel, and a tank of 10.000 gallons' capacity is located at some distance from the buildings. The site of the plant includes 18 acres, affording ample room for extension as the increasing business of the company shall demand. The railroad connection is direct to the Chicago switching roads. A description of this plant was given in our issue of September 13, 1900.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market, and Some of Their Wants:

The Hardie Tynes Foundry & Machine Co., of Birmingham, Ala., is in the market for the following good second-hand tools: One pipe machine for cutting and threading pipe 1 to 6 inches inclusive; one screw machine, Jones & Lampson preferred.

The G. Obenberger Forge Works, of Milwaukee, Wis., has been incorporated with a capital of $5 000. Incorporators: G. A. Obenberger, John Ewecker and W. J. McElroy.

The Swearingen Snutter & Iron Works, of Kansas City, Mo., has been incorporated with a capital of $5,000, for the purpose of manufacturing a fire-proof shutter. H. E. McKinney, J. H. Swearingen and N. B. Carskado are the incorporators.

The Flour City Ornamental Iron Works, of St. Paul, has been incorporated with a capital stock of $50,000. E. Teslaff, E. Rubbert, F. Schilling and Louis B. Vollmer are the incorporators.

V. Cascino, P. O. Box 911, Mexico City, Mex., asks for plans and estimates for furnishing stone cutters' machinery, planes, lathes, saws, a 20-ton 15-meter gauge traveling crane, stone-masons tools, portable machine for riveting beams, a 100-h. p. safety boiler, six or more red-pine tanks of 600 to 1,000 gallons capacity, a horseshoe-making outfit of 500 lbs. capacity, and two or three pumps for painting walls.

A company has been organized at Cleveland, Tenn., with $10,000 capital stock, to build a stove foundry at Calhoun.

The Stevenson Co., Wellsville, O., has been incorporated to operate machine shops and to deal in machinery of all kinds. Capital stock $15,000.

C. E. Smith, T. C. Hogue, T. M. Green, H. P. Quinn and others have incorporated the Washington Metal Breeching Co., Washington, Ga., with a capital stock of $4,000, for the manufacture of metal breeching, etc.

Massie & Carver, Roxboro, N. C., want to buy 50 to 60-h. p. tubular boiler, with fittings complete; 30 to 50-h. p. engine, central crank; 20 to 30-h. p. engine; also pulleys and belting.

Alabama & Georgia Iron Co., Cedartown, Ga., is in the market for one 40-h. p. slide-valve engine, new or second-hand.

The Niagara Hydraulic Engine Co., Roanoke, Va., asks estimates for the manufacture of a lot of air chambers for hydraulic rams; chambers to be made of wrought or galvanized iron.

Fires and Accidents:—

The power house of the Beloit Iron Works, of Beloit, Wis., was recently destroyed by fire, entailing a loss of $1,500.

The plant of Lane & Bodley, at Cincinnati, O., was destroyed by fire last week, entailing a loss of $200,000. The company builds saw mill machinery, traction engines, etc.

The City Foundry & Machine Works, of Bristol, Tenn., was destroyed by fire ten days ago, entailing a loss of $8,000. No insurance.

The works of the A. T. Stewart Plow Co. at East Carnegie, Pa., were completely destroyed by fire last week. Loss $75 000, only partly covered by insurance. The plant had just recently been equipped with a large amount of new machinery.

Fire on Dec 17 destroyed the plants of the Elwell-Parker Electric Co. and the Brown Hoisting Machinery Co., Cleveland. The fire was due to the exploding of a barrel of varnish in a shed adjoining the erecting department of the Elwell-Parker Electric Co. The offices alone of the Brown Hoisting Machinery Co. escaped. The total loss will probably reach over $200 000; covered by insurance. The Brown Hoisting Machinery Co. will immediately rebuild, and hopes to be in its new plant inside of three months.

The Lewis Spring & Axle Works, Jackson, Mich., was burned by fire Dec. 14; loss $50,000; insurance $45 000. It is not known how the fire originated. The plant will be rebuilt.

New Construction:—

Wm. B. Scaife & Sons, Pittsburg, are constructing a steel frame extension for one of the boiler houses of the Pittsburg Coal Co., at Hazeltine, Pa. They also have the contract for a steel frame trestle and other structural steel work for the Pennsylvania Mining Co., to be erected near Carnegie, Pa.

The Solid Steel Casting Co., of Chester, Pa., is adding a 20-ton furnace to its plant.

Nearly $50 000 has been subscribed by the citizens of Crawfordsville, Ind., for the construction of a wire plant at that place. Stockholders of the old Indiana Wire Fence Co. are promoting the new company.

It is reported that ground will be broken in DuBois, Pa., within 60 days for the erection of a new stove foundry.

The foundry and warehouse which is under construction for the Chattanooga Steel Roofing Co., at Chattanooga, Tenn., is nearing completion. Machinery will be shortly installed.

Savage & Tyler, Knoxville, Tenn., will build a 20x30-ft. addition to their machine shop.

The Jersey Central railroad will shortly commence the erection of immense car repair shops at Elizabethport, N. J.

Y. Watanabe, architect of the Imperial Japanese Navy, has contracted with the American Bridge Co. for the steel work for a foundry and a gun mounting shop for the Kure arsenal. The American Bridge Co. is also furnishing steel work for the forge shop for the Kure arsenal.

The Parkersburg (W. Va.) Iron & Steel Co. will build a new sheet mill. Wm. B. Scaife & Sons, of Pittsburg, have the contract for the buildings, which will be of steel framework covered with corrugated iron.

R. B Bradford, chief of bureau of equipment, U. S. N., Washington, D. C., asks for estimates for naval workshop for the Algiers, La., station; shops will occupy building 300x60 feet and cost about $100,000; coal depot and storage bunks will also be constructed at Algiers with capacity for 15,000 tons of coal, with latest machinery for moving and hoisting fuel.

Ground was broken on Dec. 12 for the foundation of the new McMyler plant at Warren, O. The plant will be completed by May, 1901, and will employ 800 men.

The Vicksburg, Shreveport & Pacific Railroad Co. will erect repair shops at Shreveport, La.

The Alabama & Georgia Iron Co., Cedartown, Ga., with office at 39 Broadway, New York, will erect another four-log

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washer, install another steam shovel and put on dummy engine to shift the ore cars at Grady. With this additional equipment the company will mine 1 000 tons of iron ore daily.

The Mt. Vernon Bridge Co., Mt. Vernon, O., is said to be considering plans for additions to its plant. The present capacity will be doubled.

The Toledo plant of the Shelby Steel Tube Works is to be enlarged.

The Buckeye Engine Co., Salem, O., is said to have staked out a site for a new foundry.

The contract has been awarded for the new plant of the Frankford Forge & Steel Co., Eddystone, Pa.

D. C Richards & Sons, owners of the Enterprise Machine Works at Knoxville, Tenn., recently destroyed by fire, have contracted for a new building. The cost will be approximately $20,000.

M. A. Ryan, Duluth, Minn., is enlarging his plant. A building 260x30 feet, in which $25,000 worth of new machinery will be placed, is being constructed. In addition to boiler making a general machine business will be carried on.

General Industrial Notes:—

The converting and blooming mill departments of the Ashland Steel Co.'s plant at Ashland, Ky., closed down last week.

The Champion Iron & Steel Co., Muskegon, Mich., recently added another cold mill, making five. There are six hot mills in the plant.

The Summit Wire Co., of Cuyahoga Falls, O., originally a Pennsylvania company with $25,000 capital, has been reorganized recently and incorporated in Ohio with $75,000 capital. The following directors were chosen: W. S. Fitch, of Cuyahoga Falls; J. A. Bradley, of Akron; Mrs. W. A. Fitch, of Cuyahoga Falls; Arthur L. Over and Henry Stanyon, of Pittsburg. Mr. Stanyon is a member of the firm of Miller & Stanyon, consulting engineers, of Pittsburg. The Summit Wire Co. will confine itself to the manufacture of fine wire. E. J. Jordan will be sales manager and this arrangement will permit W. S. Fitch to give more attention to the manufacturing end of the business. Henry Stanyon is consulting engineer of the Union Steel Co., which is now erecting a plant in Monessen, Pa.

At Tacoma, Wash., the machine shop of John G. Hardy is to be removed from the mainland to tide lands, containing all its heavy machinery. The building is to be cut in two and the two parts will be loaded on scows and will be towed by tugs to the new site.

The new rail mill that is being erected by the Tennessee Coal, Iron & Railroad Co. at Ensley, Ala., will probably be ready for operation next June.

At a recent meeting of the board of directors of the Dominion Iron & Steel Co., Sydney, Cape Breton, it was stated that at the close of the navigation season the company would have approximately 175 000 tons of ore on hand.

The wage difference having been adjusted, the 12 and 18-inch mills of the Sylvan Steel Works at Moline, Ill., resumed operations last week.

The furnace of the Youngstown Steel Co., Youngstown, O., has not yet gone into blast, as was expected, the cold weather having interfered with the completion of the outside work.

The Hannah furnace of the Republic Iron & Steel Co., Youngstown, O., will resume early in January. The company's second furnace at Thomas, Ala., was blown in last week.

The new foundry to be erected by Wm. Tod & Co., Youngstown, O., will be up-to-date in every particular. The foundry floor of the company is one of the best in the country.

The Canton, O., plant of the American Sheet Steel Co. closed Saturday night for repairs. The furnaces will be changed back to the old style so that coal, instead of natural gas, may be used.

W. F. Wagner, the American agent of Wm. Jessop & Sons, of Sheffield, Eng., has been in Cleveland to secure data for the English company, who may build a plant in America. It is said that if a plant is established, a Lake Erie site is preferred, and that Cleveland may be chosen.

A Pennsylvania charter has been granted the Cambria

Pig Iron and Foundry Coke

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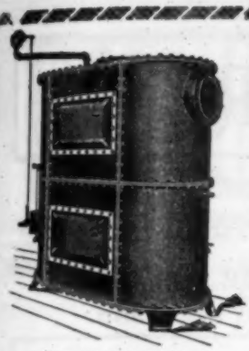
AGENTS:

The Sloss-Sheffield Steel & Iron Co., in Columbus and St. Louis territories.

The Dayton Coal & Iron Co., Ltd. in St. Louis and North West territory.

Connellsville and West Virginia Coke.



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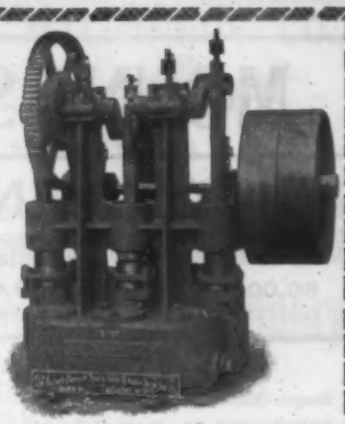

Triplex Boiler Feed Pump.

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Terminal Railroad Co., of Johnstown, Pa., with a capital of $70,000. The road will be seven miles in length. The directors are: Powell Stackhouse, J. W. Bacon, J. W. Townsend, A. P. Robinson, Charles L. Price and H. L. Endsley.

The contractors for the construction of the Youngstown-Sharon electric railroad placed an order with the National Steel Co. last week for 1,350 tons of steel rails.

The plate mill operated by the Republic Iron & Steel Co. at Sharon, Pa., was shut down last week. It is stated that the suspension is only temporary, however.

The plant of the Whitestone Forge & Construction Co., at Whitestone, L. I., has been shut down on account of lack of orders.

It is now reported that an immediate settlement of the affairs of the Nashua Iron & Brass Foundry Co., of Nashua, N. H., will be made in order that the plant may resume operations shortly. The liabilities are estimated at $40,000. The real estate and plant are valued at $30,000.

The annual meeting of the American Tin Plate Co. will be held on Jan. 15. Stock transfer books will close on Dec. 15.

Suit for dissolution of partnership has been commenced by William Rieker, one of the partners of the Cincinnati Radial Drill Co., of Cincinnati, O.

The puddlers employed at the Norristown, Pa., rolling mills have gone on a strike owing to the refusal of the company to pay the men $3.60 per ton instead of $3.40 which they have been paying for some time.

Operations were resumed last week at the Crum Lynne Iron Works at Chester, Pa., the forge and puddle departments having started up in full. The plate mill was placed in operation this week.

Years of idleness played havoc with the machinery of the Bellefonte Nail Works at Bellefonte, Pa., and at the assignee's sale which was held two weeks ago the machinery of the entire plant brought only $6,100, while the buildings containing the machinery went under the hammer at $275. The cost of erecting the plant and the installation of the machinery originally cost $180,000, but that was back in 1878. In 1887 the machinery in the plant was stopped and has never since been operated.

Work on the new 18 inch mill that is being installed at the Sylvan steel plant, at Davenport, Ia., is progressing rapidly. The mill will probably be placed in operation within a month or six weeks.

The foundry of the Mahoney Mfg. Co., of Troy, N. Y., has again resumed operations. The foundry has been recently equipped with additional steam and motive power and an electric light plant has also been installed.

Arrangements are being made to dip large sheets at the Irondale works of the American Tin Plate Co. and a new wash house is being erected. Sheets 54 x 66 will be dipped at the new plant.

The La Belle Iron Works, of Steubenville, O., intends to resume the manufacture of cut nails at the old Jefferson Iron Works plant at Steubenville.

The Bassett-Presley Co., of Cleveland, O., has been incorporated with a capital stock of $200,000. The incorporators are: I. B. Bassett, G. Presley, Jr., E. C. Kollfroth, F. H. Dietz and M. M. Hobart. The company will deal in iron and steel, succeeding Bassett, Presley & Train.

The Punxsutawney furnace, Punxsutawney, Pa., went out of blast recently for repairs to the upper part of the lining. It will probably resume the latter part of this month.

The old No. 2 puddle mill at the Brown-Bonnell plant, Youngstown, O., is being dismantled. This mill was built in 1865 and did excellent work until the panic of 1893. Since that time it has worked at intervals. The mill included about 35 single furnaces at first.

The report that the Carnegie Steel Co., of Pittsburg, was buying land at Conneaut, O., to put up a large pipe works is

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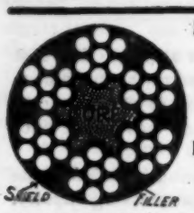

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untrue. It is stated, however, that the Carnegie Steel Co. may possibly go into the manufacture of pipe, putting up a plant near the Duquesne Steel Works.

The Sharon Brass Mfg. Co., Youngstown, O., will install an overhead crane and is erecting a cupola with a daily capacity of 7,000 pounds. The company leased recently the old Andrews brass foundry.

The Lorain Steel Co., Lorain, O., resumed work on Dec. 10 at its blooming, converting, finishing and shape mills, with more than 3,000 men employed in the entire plant. It is understood the blast furnaces will also shortly resume.

The Belmont blast furnace, Wheeling, W. Va., will resume on Jan. 1, after an idleness of six months, during which time repairs and improvements costing $30,000 were made.

The American Bridge Co. has received a contract to erect 34 bridges for the Uganda Railroad in Africa. More than 8,000 tons of structural steel will be required and the value of the order exceeds $1,000,000.

When the Cleveland-Cliffs Iron Co. has completed the foundation for its charcoal blast furnace in North Marquette, Mich., the deed for 119½ acres of land owned by the Marquette County Agricultural Society, now held in escrow, will be turned over to the company on payment of $5,000. The land is given as a bonus for the erection of the furnace.

THE *Ironmonger*, of London, Eng., has established an office in the Park Row Bldg., New York, in charge of John E. Glass.

THE Christmas number of *Scribner's* is profusely illustrated, and is artistic in every way. Dr. Henry Van Dyke contributes a story of the Hudson Bay region, and Francis Churchill Williams one which centers around the operator of a crane in a steel mill. Other well-known writers appear in this number.

LONDON advices from Calcutta have the following: "The Port Commissioners recently invited tenders for locomotives. The lowest English tender quoted £1,544 for each locomotive

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and wanted nine months to complete the order. The lowest American tender quoted £1,260 and asked for six months. The latter was accepted, subject to the approval of the government.

THE 1901 edition of the Columbia desk calendar is being distributed by the American Bicycle Co., Columbia Sales Department, Hartford, Conn. It will be sent to any address upon receipt of five two cent stamps.

Congress in Session.

Passengers for Philadelphia and New York going via Baltimore & Ohio R. R. are granted stop-over privilege of ten days at Washington and Baltimore. Rates lower than other lines. Plan your trip to Florida this winter via Washington and the beautiful Southern cities of Charlottsville, Lynchburg, Danville and Savannah. For rates and further information, call at B. & O. Ticket Office, 241 Superior St., Cleveland, O.

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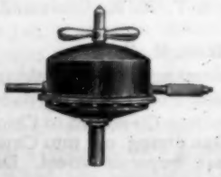
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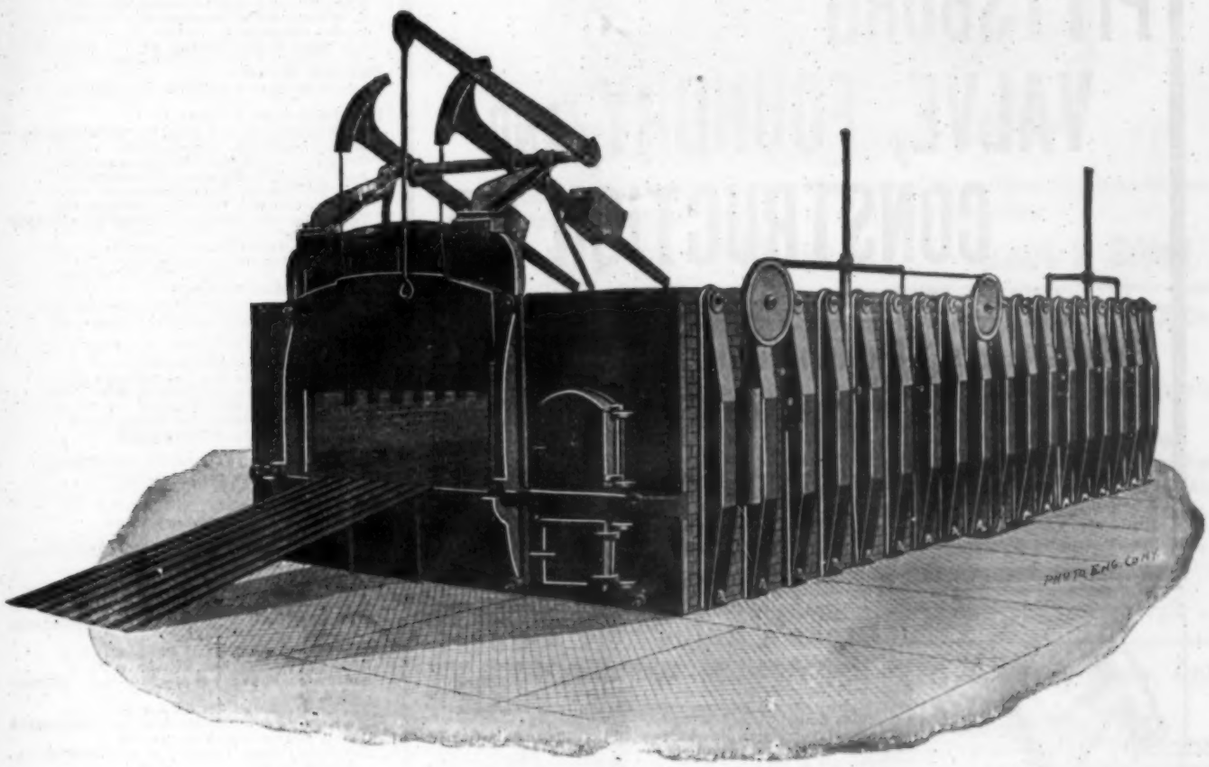

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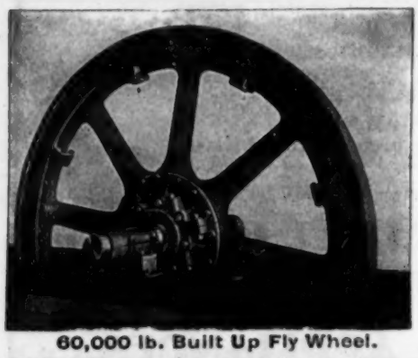

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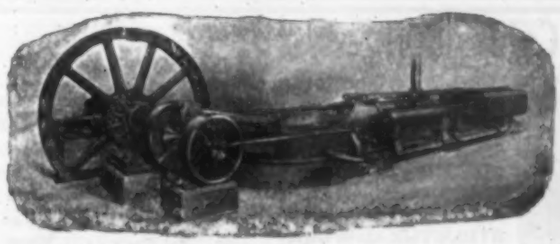

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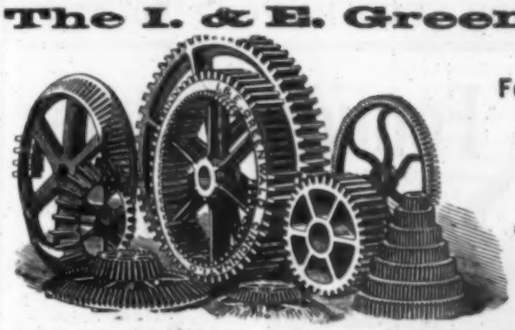

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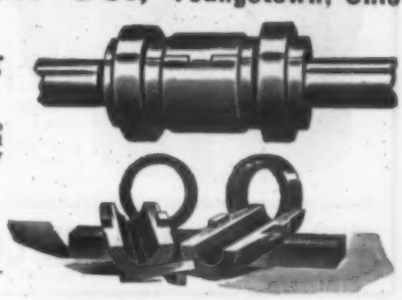

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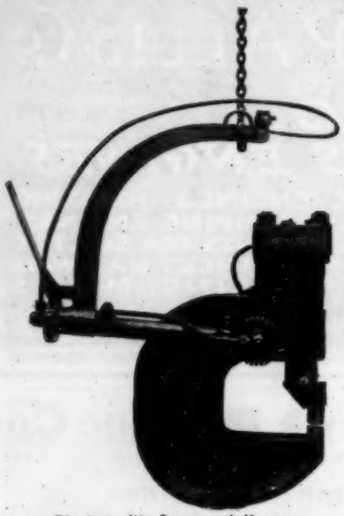

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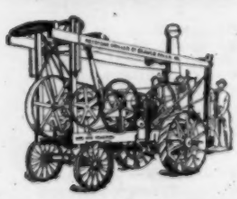

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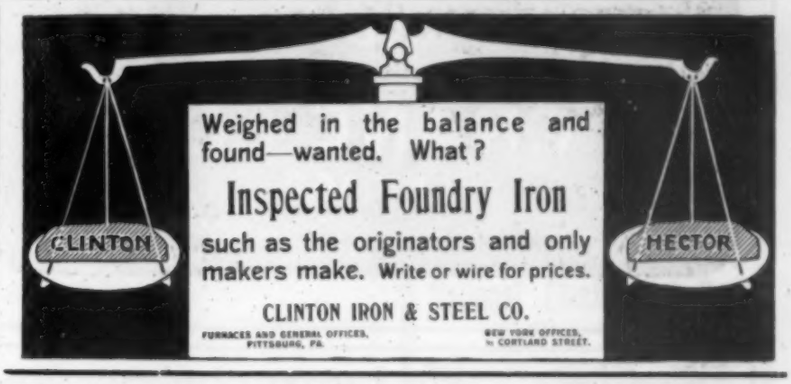
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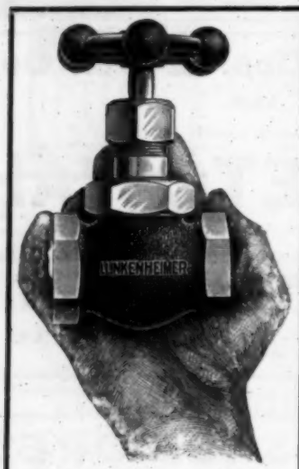

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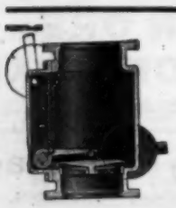

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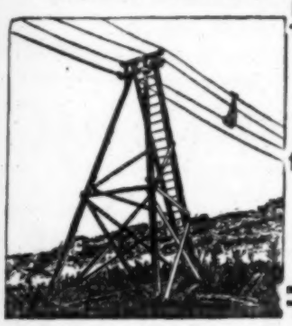

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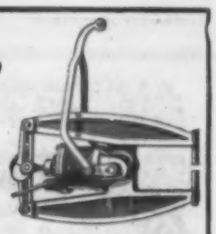

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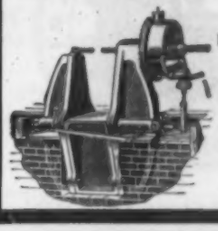

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Akron, Canton & Chicago	*8:10 A M	*9 35 P M
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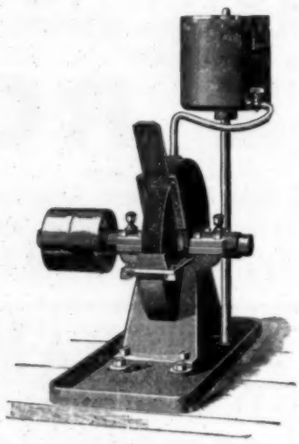

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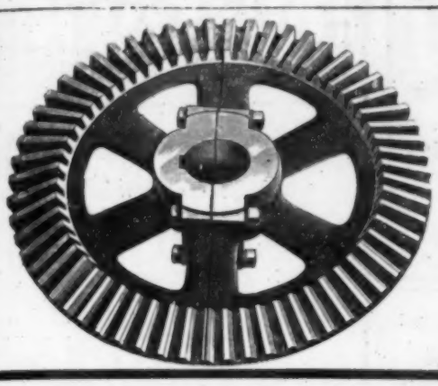

Are made in different ways; sometimes with the teeth cast necessarily imperfect in fit, wasteful of power and extravagant in ultimate cost. The next, rough cut and hand finished, a great improvement, but not up to the mark yet.

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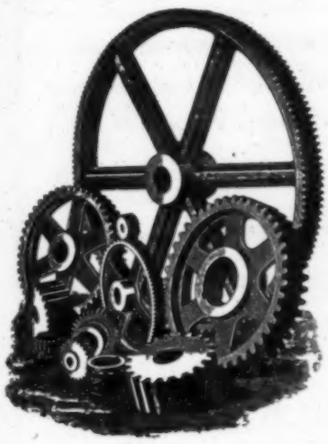

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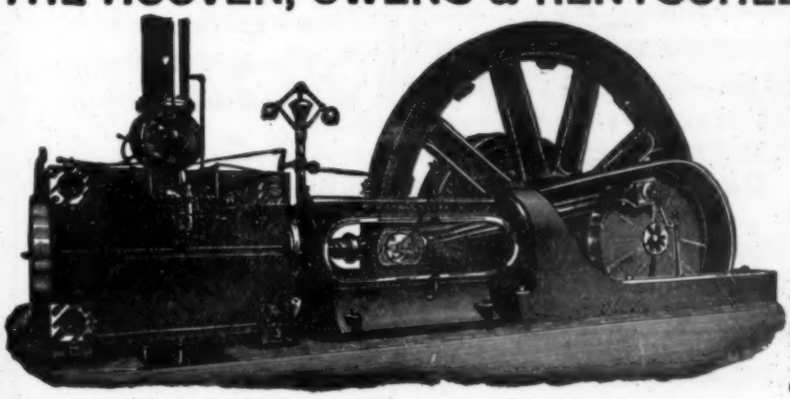

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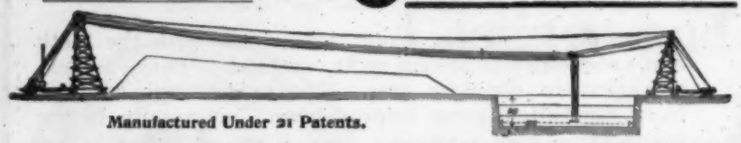

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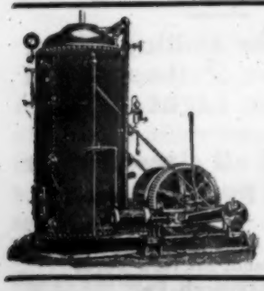

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Complete, Authorized List Now Ready.

Second Edition of Supplement to the DIRECTORY OF THE IRON AND STEEL WORKS OF THE UNITED STATES FOR 1898.

From the circular of the Association, issued under date of Sept. 15 we take the following:

"In March last we presented to the American Iron Trade a descriptive list of the consolidations of iron and steel companies which had taken place in the United States since January 1, 1898, twenty-three in all. We now present to the trade a more complete list of iron and steel consolidations, embracing those organized since March as well as those previously described, *numbering thirty in all*, the information relating to each consolidated company being revised and verified down to August 15. We have confined the list of consolidations to those which embrace the ownership of blast furnaces, rolling mills, steel works, tinplate works, and auxiliary industries, including shipbuilding and bridgebuilding works. Only companies that have been consolidated since January 1, 1898, are described in this volume, which is a Supplement to the last edition of our Directory to the Iron and Steel Works of the United States. *A new edition of the Directory cannot be printed this year.*

"The present edition of the Supplement comprises 78 well printed pages and contains an authorized description of the organization of each of the thirty consolidations mentioned, giving its capitalization, list of officers, general office address and address in most instances of the district offices, and a list of properties owned or operated by it, with the names of previous owners of iron and steel works. The name and the character of every plant are fully stated. For detailed information concerning the plants mentioned and their products reference is given to the page or pages in the Directory in which they are fully described. Iron ore mines, coal mines, coke ovens, railroads, and lake vessels owned by the consolidated companies are also given in sufficient detail."

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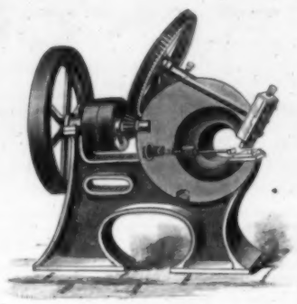

This cut illustrates our No. 1 Bevel Shear which has capacity to bevel ½ in. plate. We make another size shear with capacity to bevel 1 in. plate. We have a No. 1 Bevel Shear on hand for immediate shipment, and if you can use a tool of this kind in your shop we will make you an attractive price on same, and guarantee the shear in every respect.

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The Cleveland Punch and Shear Works Co.,
CLEVELAND, OHIO, U. S. A.

DIRECTORY

To the Iron and Steel Works of the United States for 1898.

PUBLISHED BY
THE AMERICAN IRON AND STEEL ASSOCIATION.

Thoroughly Revised. Price, Seven Dollars

The lists of Plate and Sheet Mills and of Tin Plate and Stamping Works are much more complete than in previous editions. The names and location of all the works described are given in alphabetical order, followed by a description of their character, capacity and products, with the names of the principal officers, etc., including the names of selling agents. This edition makes a cloth-bound book of nearly 400 well-printed pages—many more than in any previous edition It contains a complete list of all the

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Rolling Mills,
Bessemer Steel Works,
Open-Hearth Steel Works,
Crucible Steel Works,
Plate and Sheet Mills,
Rail Mills,
Structural Mills,
Steel Casting Works,
Cut-Nail Works,
Tin Plate Works,
Stamping Works,
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Wire Rod and Wire Mills,
Wire Nail Works,
Iron and Steel Bridge Builders,
Iron and Steel Ship Builders,
Horse-Nail Works,
Locomotive Works,
Malleable Iron Works,
Cast Iron Pipe Works,
Cast Iron Soil and Plumbers' Pipe Works,
Wrought Iron, Wrought Steel and Riveted Pipe Works,
Seamless Tube Works,
Chain Works,
Bolt, Nut and Rivet Works,
Car Axle Works,
Car Wheel Works, and
Car Builders in the United States.

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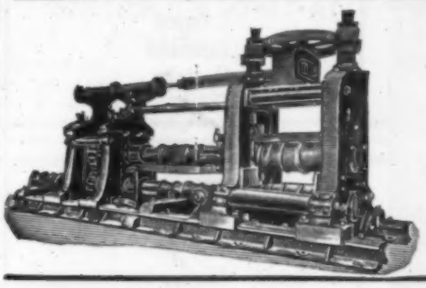

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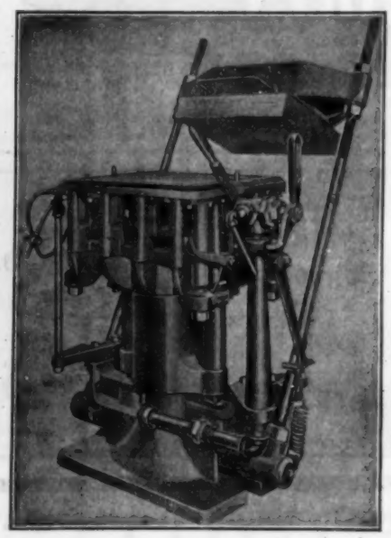

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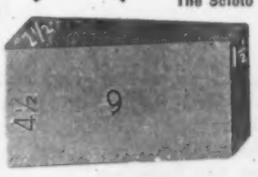

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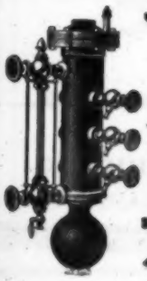

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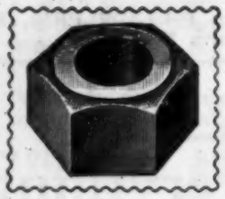

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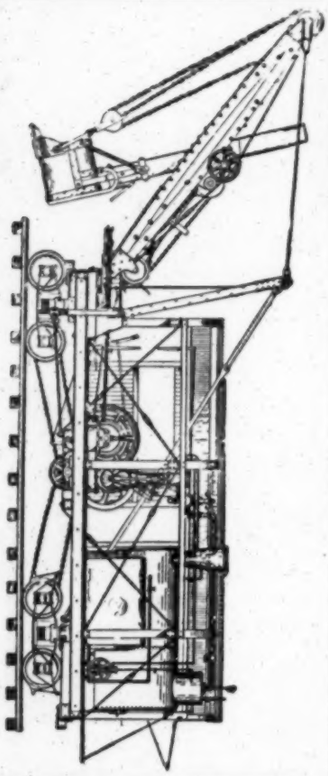

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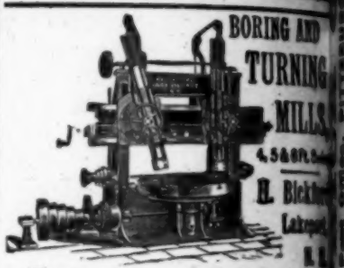

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